

APPENDICES

ENERGY ENGINEERING ANALYSIS PROGRAM

LIMITED ENERGY STUDY

FORT HUNTER-LIGGETT, CALIFORNIA 1993

VOLUME II

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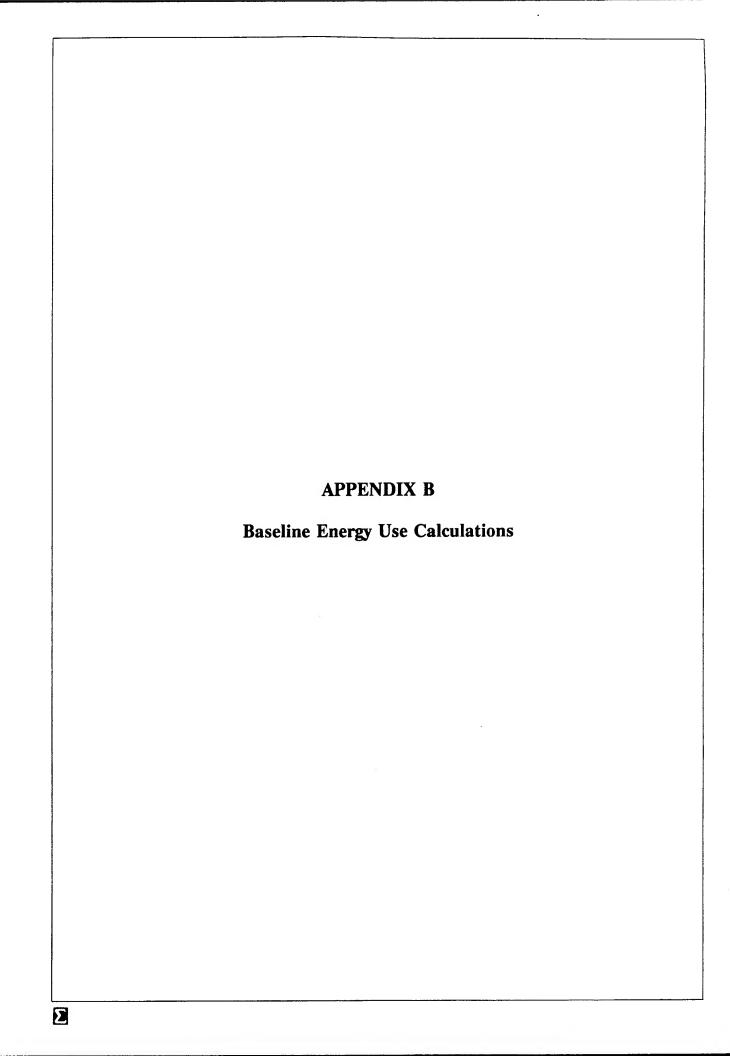
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APPENDIX B

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APPENDIX B

BASELINE ENERGY USE CALCULATIONS

B.1 Methodology

Energy consumption in selected existing buildings is determined for various categories of end-use separately for fuel oil, propane and for electric power consumption. Categories of energy end-use and tables where results are summarized include:

- Heating, Table B-2
- Cooling, Table B-2
- Ventilation, Table B-2
- Domestic Hot Water, Table B-2
- Lighting, Table B-3
- Process, Table B-3

Existing conditions for baseline energy use are determined based on field data using computer simulations, standard engineering calculations and empirical information developed from similar investigations. The results are tabulated and compared to available consumption records. Results of building energy use calculations are summarized on Table B-1.

Procedures used to determine energy consumption for each of the above categories are addressed below.

B.2 Space Heating, Cooling, and Ventilation Energy Use

Heating, cooling, auxiliary equipment, and ventilation energy uses are determined using the computer simulation program: Trane Air Conditioning Economics (TRACE) 600.

The TRACE 600 program is used on buildings as identified on Table B-4. This program calculates hour-by-hour loads for each zone.

Results of building simulations are shown on Table B-2.

Manual calculations are used to determine energy use for the remaining buildings evaluated. HVAC energy use is calculated based on results of TRACE 600 runs on similar buildings, fuel and electric power consumption records and on manual calculations of block loads considering the weather data developed in Appendix C.

Data for simulation programs and manual calculations are taken from the available information contained in:

- Building survey notes (see Appendix F).
- Available building plans, copies of which were made during site visits.
- Interviews with Directorate of Engineering and Housing personnel.
- Building information schedules and fuel use records and efficiency measurements.

Although Tables B-1 and B-2 show only the baseline HVAC energy use for each building, buildings are resimulated and evaluated with changed conditions for analyses of various energy conservation opportunities (ECO's). Refer to Appendix D for ECO calculations.

B.2.1 Heating Energy Use

Heating energy used to serve heating loads is recorded as fuel oil, propane and/or as electricity use. These entries correspond to energy consumed by boilers (fuel only) and/or by electric resistance heaters and heat pumps.

The efficiencies of heating equipment used to determine energy use are based on measurements and observations made during building surveys. Results are shown on Table B-5 for heating system fired equipment. Equipment is described in Appendix F.

B.2.2 Cooling Energy Use

Cooling energy use is summarized on Table B-2. Only electricity use is recorded because there are no absorption cooling devices in the EEAP buildings. The coefficients of performance (COP) used are based on measurements of operating cooling equipment and on manufacturer's data. Cooling system data is tabulated in Appendix F.

B.2.3 Auxiliary and Ventilation Equipment Energy Use

Electricity use for auxiliary and ventilating equipment is indicated on Table B-4. This equipment includes such items as boiler burner blowers, fuel pumps, air handlers and condenser fans, circulation pumps, etc. Energy use estimates are based on the operating characteristics of the various heating and cooling equipment. Operating schedules for buildings and their mechanical systems as well as the types and sizes of equipment are based on observations made during building surveys.

B.3 Domestic Hot Water Energy Usage

Energy consumption for heating domestic hot water (DHW) is a function of:

- Per capita consumption of DHW (gallons per person per day, GPCD)
- Actual temperature of DHW
- Temperature of the water supply
- Domestic hot water heating system efficiency

Table B-6 is a summary of per capita consumption data used for calculating DWH usage. This information has been developed based on guidance referenced in the table.

Domestic hot water heating system efficiencies are shown on Table B-7. Where both electric and fuel oil-fired systems are installed, the portion of the load that each system satisfies is indicated.

Temperatures used for determining existing energy consumption were measured during field investigations.

In accordance with Fort Ord Regulation 11-2, and authorized DHW temperatures, temperatures measured during field investigations are listed in Appendix C and are shown in print-outs associated with ECO C-1 Reduce Domestic Hot Water Temperatures. (See Appendix D)

The water supply temperature is assumed to be 60 degrees F during the summer and 50 degrees F during winter. An average of 55 degrees F is used in calculations.

Baseline domestic hot water energy consumption calculations appear on Table B-8.

Domestic hot water energy consumption for multiple use buildings are determined by considering occupancies and temperatures of component uses separately.

Piping and tank thermal losses are calculated separately and tabulated in Table B-8. Tank and piping loss calculations appear later in this Appendix.

B.4 Lighting Energy Consumption

Lighting energy consumption is broken down into the following categories for reporting purposes:

- Interior Lighting
- Exterior Lighting

Lighting energy usage is summarized on Table B-3. Detailed calculations appear on Table B-9.

The methodology used in calculating lighting energy use is addressed later in this Appendix. Lighting fixture type data is summarized in Appendix F.

B.5 Process Energy Usage

Process energy is any energy use which is not included under space heating, cooling, or ventilation, domestic hot water (DHW) heating (including DHW used in dining facilities and clubs) or lighting systems.

Process energy uses are determined for each type of building function. Factors are developed based on detailed considerations and metering of process energy use in several similar projects. Factors are summarized later in this Appendix. Process energy calculations are shown on Table B-10.

Most process energy consumption involves electric powered equipment and systems such as: ice machines, water coolers, vending machines, office equipment, coffee pots, televisions, other small appliances and shop equipment.

Energy usage rates for various building functions are summarized and explained later in this Appendix.

B.6 Estimated Energy Use Versus Recorded Energy Use

Estimates of energy uses for Fort Hunter-Liggett (FHL) buildings and exterior lighting systems are compared to records of FY92 fuel consumption and power generation on Table B-11. Use of the most recent complete year of energy use records for checking estimates requires fewer adjustments to account for demolitions and newly constructed facilities.

Tables B-1 through B-3 summarize results of estimated energy use for:

- Heating, ventilating and air conditioning (HVAC)
- Domestic hot water heating
- Lighting (interior and exterior)
- Process energy use

Fuel oil, propane and electricity use are addressed separately. Deliveries of fuel oil and propane to FHL buildings are compared to estimates for fuel oil using buildings on Table B-11. As can be seen, all estimates are close to 10 percent of fuel deliveries.

No records are available for fuel oil deliveries to individual buildings. Recorded consumption is based on DEH trips to fill all tanks. Propane delivery records for

individual buildings are available only for the period between 6 November 1991 and 31 August 1992. These records were normalized to a full year based on ratios of 65 degree F-based Heating Degree Hours for the periods of record and no-record.

Electric power metering is not available on a building-by-building basis. Thus, totals of estimated electricity use are compared to power plant records for each site on Table B-10. Results indicate that estimated electricity use agrees with records for FY87.

Baseline energy use calculations are, thus, validated for use as the basis from which energy conservation opportunities are evaluated. Estimated energy use is a little lower than the records indicate for all energy types. A low estimate provides for conservative analysis of energy saving opportunities.

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	eline Energ	y Use	Energy pe	r Floor SF
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
			MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
T 6	Family Housing NCO & Enl	1,090		113	14,938	163	150.0
P 41A	Family Housing NCO & Enl	1,397		60	21,587	134	95.8
P 41B	Family Housing NCO & Enl	1,937	1	43	10,130	78	40.1
P 42A	Family Housing NCO & Enl	1,937		63	23,442	143	· 73.8
P 42B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 43A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 43B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 44A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 44B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 45A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 45B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 46	Family Housing CG & WO	2,089		59	18,710	123	58.9
P 47	Family Housing CG & WO	2,089	1	59	18,710	123	58.9
P 51A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 51B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 52A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 52B	Family Housing NCO & Ent	1,937		43	10,130	78	40.1
P 53	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 54	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 55	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 56	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 57	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 58	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 59	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 60	Family Housing CG & WO	2,089		57	18,710	121	57.9
S 79	Post Office, Main	1,000			4,028	14	13.7
P 80	Exchange, Main Retail	9,093		148	157,389	685	75.4
P 81	Theater with Dressing Rm's	6,719		150	55,915	341	50.7
P 101	Open Din Cons (Hacienda)	6,171		1,452	235,466	2,256	101.6
•	Club (Bar)	3,046					
4	Hacienda, East Rooms	4,721					
	Hacienda, West Rooms	8,273					
P 116	Exchange Service Station	1,126		35	7,153	59	33.2
	(Non-shop areas)	662					
T 120	Fire Station - Office	3,636		948	177,017	654	58.2
	Fire Station - Dorm	2,653					
	Fire Station - Garage	4,949					
T 121	Bowling Center	4,952		98	81,291	376	67.3
		628		İ			
T 124	Family Housing LC & MJ	2,001		309	25,187	395	197.5
T 127	Officers Quarters Military	2,250		320	15,729	374	166.1
P 128	Officers Quarters Military	20,196		2,013	335,214	3,157	156.3
T 131	Family Housing CG & WO	998		107	14,095	155	155.4
S 144	Gymnasium	7,172		53	6,909	76	10.6

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	eline Energy	/ Use	Energy pe	er Floor SF
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
,,,,,			MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
S 146	FE Facility	4,042		256	9,369	288	71.2
T 149	Family Housing NCO & Enl	1,196		203	14,692	254	212.1
T 156	FE Facility - Shop	1,753		200	12,187	42	18.5
1 150		497			12,101	-	10.0
T 450	FE Facility - Office				50	0.2	0.1
T 158	Vehicle Storage	1,859		92	16,557	140	62.1
T 161	Admin General Purpose	2,250		83		+	55.1
T 162	Elec Maint. Shop	2,250		83	11,902	124	
T 163	Officers Quarters Military	2,250		83	9,253	115	51.0
T 164	Admin General Purpose	2,250		83	12,977	128	56.7
T 165	Admin General Purpose	2,250		83	12,977	128	56.7
T 166	Officers Quarters Military	2,250		83	9,253	115	51.0
T 167	Officers Quarters Military	2,250		83	9,253	115	51.0
S 168	General Purp Warehouse	6,560			178	1	0.1
T 172	Cold Storage Warehouse	800			22	0	0.1
P 177	Technical Library	3,599		23	33,700	138	38.3
P 178	Child Development Cntr	3,599		143	47,537	305	84.8
S 182	Commissary	3,000		51	207,050	758	252.7
S 186	Sup Svc Admin Bldg	1,920		120	21,635	193	100.7
P 190	Post Chapel	2,720	310		45,185	464	170.7
S 197	Admin Bldg R&D - Office	2,100		268	119,544	676	82.8
	Admin Bldg R&D - Electronics	6,062					
S 198	General Inst Bldg	1,090		49	5,304	67	61.6
P 205	Admin General Purpose	35,820	1,952		431,110	3,423	83.5
P 205A	Company HQ Building	5,161			•		
P 206	Enlisted Pers Dining Fac	16,768	4,851		336,665	6,000	357.8
	Kitchen Area - Scullery		.,	1			
P 207	Enl Barracks w/o Dining	35,820	2,420		420,291	3,855	94.1
P 207A	Company HQ Building	5,161	_,		,	.,	
P 208	Enl Barracks w/o Dining	35,820	2,443		426,427	3,898	95.1
P 208A	Company HQ Building	5,161	_, , , ,		.20, .2.	,,,,,,	33.7
P 209	AAFES Snack Bar	3,320		92	248,311	939	282.9
P 210	HIth/Dntl Clinic w/ Beds	10,973	3,048		320,937	4,144	377.6
	Outdoor Swimming Pool	10,370	0,040	1,211	36,436	1,335	577.5
P 211		8,907		1,094	90,714	1,404	157.6
	Gymnasium Dhysical Eitness Contor			500	46,441	659	205.0
P 219	Physical Fitness Center	3,212	0.070	500	418,400	3,507	76.1
P 229	Enl Barracks w/o Dining	40,915	2,079	1	410,400	3,507	70.1
P 229A	Company HQ Building	5,161	0.004		400 000	0.700	20.4
P 230	Enl Barracks w/o Dining	35,820	2,324	. 11	428,922	3,788	92.4
P 230A	Company HQ Building	5,161		V 1	00.000	400	50.0
S 235	Admin General Purpose	3,000		46	32,302	157	52.2
S 236	Admin General Purpose	3,000		47	32,302	157	52.4
S 237	Admin General Purpose	3,000		115	32,302	225	75.0
S 238	Sig Photo Lab	14,548		555	112,807	941	64.6
	Process						

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	line Energ	y Use	Energy pe	
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
			MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
P 240	Admin General Purpose	3,000		38	32,302	148	49.5
S 241	GM Facility	10,000		153	217,159	742	74.2
S 243	Admin General Purpose	3,000		33	32,302	143	47.8
S 244	Admin General Purpose	3,000		33	32,302	143	47.8
S 246	Admin General Purpose	3,000		33	32,302	143	47.8
S 247	Admin General Purpose	3,000		38	32,302	148	49.5
P 252	Vehicle Maint Shop DS	12,299	919		64,833	1,140	92.7
P 256	Vehicle Maint Shop ORG	5,294	403		30,371	507	95.7
P 259	Vehicle Maint Shop ORG	13,667	1,010		60,636	1,217	89.0
S 283	FE Maintenance Shop	4,000		143	11,329	181	45.4
S 286	Admin General Purpose	3,000		57	31,224	163	54.5
P 287	Recreation Building	5,584		193	80,676	469	83.9
S 288	General Purpose Warehouse	3,000		57	28,590	154	51.5
S 290	Electron Equip Facility	14,856		1,127	196,373	1,797	121.0
S 291	Cont Humid Warehouse	7,400		490	114,816	882	119.2
P 295	Enl Barracks w/o Dining	46,593		3,019	867,426	5,980	128.3
P 301	ADP Building	10,800		352	647,981	2,213	204.9
A 4							
P 642	Detached Latrine/Shower	995		117	1,002	120	120.7
S 2201	Control Tower - Range SPT	891			1,155	4	4.4
 	Bldg Totals	625,458	21,759	18,337	8,078,661	67,668	108.2
	Water Well				136,240	465	
	Exterior Lighting				197,190	673	
	Non-Scope SF	152,002			1,481,731	5,057	33.3
	Grand Total	777,460	21,759	18,337	9,893,823	73,863	95.0

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility	Baseline l	IVAC Energ	gy Use	Baseline D	HW Energ	y Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
Т 6	Family Housing NCO & Enl		58.7	6,657		43.3	
P 41A	Family Housing NCO & Enl		17	11,456		32.6	
P 41B	Family Housing NCO & Enl				-	32.6	
P 42A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 42B	Family Housing NCO & Enl				-	32.6	
P 43A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 43B	Family Housing NCO & Enl			·		32.6	
P 44A	Family Housing NCO & Enl		20	13,312		32.6	
P 44B	Family Housing NCO & Enl			,		32.6	11
P 45A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 45B	Family Housing NCO & Enl			,		32.6	
P 45B	Family Housing CG & WO	-	14	8,248	_	34.6	
P 47	Family Housing CG & WO	 	14	8,248	-	34.6	
P 51A	Family Housing NCO & Enl	 	19.9	13,312	_	32.6	<u> </u>
P 51B	Family Housing NCO & Enl		10.5	10,012		32.6	
	Family Housing NCO & Enl	 	20	13,312	<u> </u>	32.6	
P 52A	Family Housing NCO & Enl		20	10,012		32.6	1
P 52B P 53	Family Housing CG & WO	-	14	8,248		32.6	
P 54	Family Housing CG & WO		14	8,248		32.6	
P 55	Family Housing CG & WO		14	8,248	<u> </u>	32.6	
P 56	Family Housing CG & WO		14	8,248		32.6	
	Family Housing CG & WO		14	8,248	<u> </u>	32.6	
P 57 P 58	Family Housing CG & WO	 	14	8,248	<u> </u>	32.6	
P 59	Family Housing CG & WO		14	8,248		32.6	
P 60	<u> </u>		14	8,248		32.6	
S 79	Family Housing CG & WO Post Office, Main	 	17	1,565	<u> </u>	02.0	
			148	14,479			20,692
P 80	Exchange, Main Retail		150	9,488			43,067
P 81	Theater with Dressing Rm's		728	18,652		111.8	40,007
P 101	Open Din Cons (Hacienda)		359	12,941		29.9	
	Club (Bar)		339	134,563	[]	101.5	
	Hacienda, East Rooms		•	134,503		110.9	
2442	Hacienda, West Rooms	1	35			110.3	826
P 116	Exchange Service Station		35	1,550			020
T 400	(Non-shop areas)	 	444	11,757		28.3	
T 120	Fire Station - Office		324		[151.5	
	Fire Station - Dorm		324	3,459	1	151.5	
7.461	Fire Station - Garage	 	50	25 000		45.1	
T 121	Bowling Center		53	25,990		43.1	8,599
T 124	Family Housing LC & MJ		245	14,917	-	54.2	
T 127	Officers Quarters Military	Ī	193	2,783	-	126.9	
P 128	Officers Quarters Military		1,333	109,508		680.1	
T 131	Family Housing CG & WO		50	6,015	-	46.8	
S 144	Gymnasium		53	418	-	0.0	

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility	Baseline F	VAC Energ	y Use	Baseline D	HW Energ	y Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
S 146	FE Facility		256	2,464	-	-	11
T 149	Family Housing NCO & Enl		146	7,668		46.8	
T 156	FE Facility - Shop		-	823	-	-	979
	FE Facility - Office						•
T 158	Vehicle Storage		-	0	-	•	
T 161	Admin General Purpose		83	5,878	•	•	
T 162	Elec Maint. Shop		83	5,878	-	•	
T 163	Officers Quarters Military		83	5,878		•	
T 164	Admin General Purpose		83	5,878	-	-	
T 165	Admin General Purpose		83	5,878		•	
T 166	Officers Quarters Military		83	5,878	-	•	
T 167	Officers Quarters Military		83	5,878	•	•	
S 168	General Purp Warehouse	No Heat	No Heat	No Heat	-	-	
T 172	Cold Storage Warehouse	No Heat	No Heat	No Heat	•	•	
P 177	Technical Library		23	14,395	-	-	
P 178	Child Development Cntr		86	17,993	-	56.7	
S 182	Commissary		51	5,643	-	•	3,585
S 186	Sup Svc Admin Bldg		120	8,677	-	•	
P 190	Post Chapel	310	-	36,505		-	2,726
S 197	Admin Bldg R&D - Office		268	16,361	-	-	931
	Admin Bldg R&D - Electronics		-	62,202			
S 198	General Inst Bidg		49	356		•	
P 205	Admin General Purpose	1,867	0	272,346	84.6		
P 205A	Company HQ Building				-		647
P 206	Enlisted Pers Dining Fac	3,945	-	108,696	905.8	-	
	Kitchen Area - Scullery				-	-	
P 207	Enl Barracks w/o Dining	1,867	-	268,570	553.3	-	
P 207A	Company HQ Building				<u> </u>	-	776
P 208	Enl Barracks w/o Dining	1,867	-	269,875	575.9	-	
P 208A	Company HQ Building					-	909
P 209	AAFES Snack Bar		92	68,438	·	•	67,115
P 210	Hith/Dntl Clinic w/ Beds	1,025	-	154,590	2,023.9	-	
P 211	Outdoor Swimming Pool		1,211	36,436	-	0.0	
P 212	Gymnasium		1,071	49,087	-	22.9	
P 219	Physical Fitness Center		430	17,812		70.1	
P 229	Enl Barracks w/o Dining	1,867	0	286,869	212.1	•	
P 229A	Company HQ Building					_	688
P 230	Enl Barracks w/o Dining	1,867	0	276,484	457.0	-	
P 230A	Company HQ Building				-	-	794
S 235	Admin General Purpose		46	18,805		-	
S 236	Admin General Purpose		47	18,805	-	•	
S 237	Admin General Purpose		115	18,805	-	•	
S 238	Sig Photo Lab		508	31,024	-	47.5	
1	Process					35.6	

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility		IVAC Ener		Baseline D		y Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
P 240	Admin General Purpose		38	18,805	-	-	
S 241	GM Facility		153	162,971	-	-	3,009
S 243	Admin General Purpose		33	18,805	-		
S 244	Admin General Purpose		33	18,805	-	-	
S 246	Admin General Purpose		33	18,805	-	-	
S 247	Admin General Purpose		38	18,805		-	
P 252	Vehicle Maint Shop DS	919	•	27,085	-	-	3,715
P 256	Vehicle Maint Shop ORG	403	-	10,742	-	-	4,980
P 259	Vehicle Maint Shop ORG	1,010	-	19,377	-	-	3,440
S 283	FE Maintenance Shop		143	509	-	-	
S 286	Admin General Purpose	T	57	18,805	-	-	
P 287	Recreation Building		132	53,904	-	61.5	
S 288	General Purpose Warehouse		57	18,805	-	-	
S 290	Electron Equip Facility		1,064	150,755	-	62.4	
S 291	Cont Humid Warehouse		490	96,071	-	-	
P 295	Enl Barracks w/o Dining	0	2,199	703,890	-	819.8	
P 301	ADP Building		352	95,034	-	•	1,898
P 642	Detached Latrine/Shower			19	-	116.7	
S 2201	Control Tower - Range SPT		-	349		-	
	Bldg Totals	16,946	14,375	4,111,758	4,813	3,657	169,376
	Water Well						
	Exterior Lighting						
	Non-Scope SF	Nil	Nil	999,260	Nil	Nil	Nil
	Grand Total	16,946	14,375	5,111,018	4,813	3,657	169,376

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting	Baseline Pr	rocess Ene	rgy Use
No.	Name	(SF)	Energy	Process	Cooking	Cooking/Other
		` ′	kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop MBTU/Yr
Т6	Family Housing NCO & Enl	1,090	2,381	5,900	Included	10.5
P 41A	Family Housing NCO & Enl	1,397	4,230	5,900	Included	10.5
P 41B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 42A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 42B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 43A	Family Housing NCO & Enl	1,937	4,230	5,900	included	10.5
P 43B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 44A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 44B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 45A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 45B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 46	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 47	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 51A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 51B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 52A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 52B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 53	Family Housing CG & WO	2,089	4,562	5,900	included	10.5
P 54	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 55	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 56	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 57	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 58	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 59	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 60	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
S 79	Post Office, Main	1,000	764	1,700		
P 80	Exchange, Main Retail	9,093	10,134	112,084		
P 81	Theater with Dressing Rm's	6,719	2,301	1,058	00.400	
P 101	Open Din Cons (Hacienda)	6,171	8,423	0	39,420	
	Club (Bar)	3,046		6,092	5,475	
	Hacienda, East Rooms	4,721		4,000	Indical	10.5
	Hacienda, West Rooms	8,273	0.470	5,900	Included	10.5
P 116	Exchange Service Station	1,126	3,170	481		
	(Non-shop areas)	662	148,678	1,126		
T 120	Fire Station - Office	3,636	148,078	3,291	6,899	-
	Fire Station - Dorm	2,653		2,800	0,099	
	Fire Station - Garage	4,949	00,600	134	E 47E	
T 121	Bowling Center	4,952	23,600	4,482	5,475	
T 101	Camilla Haveing LO 9 A4 L	628	4,370	13,144 5,900	Included	10.5
T 124	Family Housing LC & MJ	2,001		4,000	included	10.5
T 127	Officers Quarters Military	2,250	8,946	32,000	52,560	
P 128	Officers Quarters Military	20,196	141,146	5,900	Included	10.5
T 131	Family Housing CG & WO	998	2,180	6,491	iriciaaea	10.5
S 144	Gymnasium	7,172		0,491		

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting		Baseline Pr	ocess Ene	rgy Use
No.	Name	(SF)	Energy		Process	Cooking	Cooking/Other
		` ,	kWH/Yr		kW-Hr/Yr	kW-Hr/Yr	Prop MBTU/Yr
S 146	FE Facility	4,042	5,179	ľ	1,727		
T 149	Family Housing NCO & Enl	1,196	1,124	ı	5,900	Included	10.5
T 156	FE Facility - Shop	1,753	9,186		749		
	FE Facility - Office	497	1 1		450		•
T 158	Vehicle Storage	1,859		ı	50		
T 161	Admin General Purpose	2,250	8,643		2,036		
T 162	Elec Maint. Shop	2,250	5,063	r	961		
T 163	Officers Quarters Military	2,250	3,375	Г	NA		
T 164	Admin General Purpose	2,250	5,063	Г	2,036		
T 165	Admin General Purpose	2,250	5,063	Г	2,036		
T 166	Officers Quarters Military	2,250	3,375		NA		
T 167	Officers Quarters Military	2,250	3,375		NA		
S 168	General Purp Warehouse	6,560		l	178		
T 172	Cold Storage Warehouse	800			22	Also see E	3ldg 182
P 177	Technical Library	3,599	16,048		3,257		
P 178	Child Development Cntr	3,599	19,089		272	10,184	
S 182	Commissary	3,000	25,040	I	172,782		
S 186	Sup Svc Admin Bldg	1,920	11,221	l	1,738		
P 190	Post Chapel	2,720	3,253	l	1,058	1,643	
S 197	Admin Bldg R&D - Office	2,100	35,560	l	1,901		
	Admin Bldg R&D - Electronics	6,062	33,333	ı	2,589		
S 198	General Inst Bldg	1,090	3,961	l	986		
P 205	Admin General Purpose	35,820	90,837	r	32,417		
P 205A	Company HQ Building	5,161	30,192		4,671		
P 206	Enlisted Pers Dining Fac	16,768	43,023	I		184,946	
	Kitchen Area - Scullery			ı		ĺ	
P 207	Enl Barracks w/o Dining	35,820	84,082	I	32,000		
P 207A	Company HQ Building	5,161	30,192		4,671		
P 208	Enl Barracks w/o Dining	35,820	84,781	r	36,000		
P 208A	Company HQ Building	5,161	30,192		4,671		
P 209	AAFES Snack Bar	3,320	7,568	r	6,640	98,550	
P 210	Hith/Dntl Clinic w/ Beds	10,973	126,081	t	37,308	2,957	
P 211	Outdoor Swimming Pool	-	1 1 1 1	r		·	
P 212	Gymnasium	8,907	33,566	1	8,061		
P 219	Physical Fitness Center	3,212	25,722	-	2,907		
P 229	Enl Barracks w/o Dining	40,915	84,781	1	11,200		
P 229A	Company HQ Building	5,161	30,192		4,671		
P 230	Enl Barracks w/o Dining	35,820	84,781	1	32,000		
P 230A	Company HQ Building	5,161	30,192		4,671		
S 235	Admin General Purpose	3,000	10,783	1	2,715		
S 236	Admin General Purpose	3,000	10,783	1	2,715		
S 237	Admin General Purpose	3,000	10,783	-	2,715		
S 238	Sig Photo Lab	14,548	52,191	H	13,166		
3 230	Process	17,570	JE, 131	1	16,425		
	riocess			L	10,720		

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting	Baseline Process Energy Use
No.	Name	(SF)	Energy	Process Cooking Cooking/Other
			kWH/Yr	kW-Hr/Yr kW-Hr/Yr Prop MBTU/Yr
P 240	Admin General Purpose	3,000	10,783	2,715
S 241	GM Facility	10,000	42,129	9,050
	1			
		0.000	10.700	
S 243	Admin General Purpose	3,000	10,783	2,715
S 244	Admin General Purpose	3,000	10,783	2,715
S 246	Admin General Purpose	3,000	10,783	2,715
S 247	Admin General Purpose	3,000	10,783	2,715
P 252	Vehicle Maint Shop DS	12,299	28,780	5,254
P 256	Vehicle Maint Shop ORG	5,294	12,388	2,261
P 259	Vehicle Maint Shop ORG	13,667	31,981	5,838
S 283	FE Maintenance Shop	4,000	9,112	1,709
S 286	Admin General Purpose	3,000	9,704	2,715
P 287	Recreation Building	5,584	15,604	11,168
S 288	General Purpose Warehouse	3,000	9,704	81
S 290	Electron Equip Facility	14,856	39,273	6,346
S 291	Cont Humid Warehouse	7,400	15,584	3,161
P 295	Enl Barracks w/o Dining	46,593	117,936	45,600
P 301	ADP Building	10,800	46,003	9,774
				495,272
P 642	Detached Latrine/Shower	995	983	
S 2201	Control Tower - Range SPT	891		806
	Bldg Totals		1,958,377	1,431,044 408,107 304.5
	Water Well			136,240
	Exterior Lighting		197,190	
	Non-Scope SF	152,002	475,935	6,536 Shop/Wh
	Grand Total	777,460	2,631,502	1,573,820 408,107 304.5

Table B-4 Baseline HVAC Energy Use Calculations Results

3	200	Printiary nearing Energy Use	A REST	986	Tilliary COOIII		J.Se	12	Auxiliary Energy Use	rgy Use		lotal HVAC Energy Use	nergy Use		HVAC Energy per Floor SF	per Floor SF
ġ	Estimate Basis	Electric kWH/Yr	Propane Mil BTU/Yr	Fuel Oil Mil BTU/Yr	Compressor kWH/Yr	CT/Cond KWH/Yr	Cond Pmp kWH/Yr	Other Acc kWH/Yr	SA Fans kWH/Yr	Circ Pmp kWH/Yr	Base Util kWH/Yr	Electric KWH/Yr	Propane Mil BTU/Yr	Fuel Oil	Total	HVAC k BTU/SF-Yr
9	NIG		58.7		5,500	All compon	ents included		1.157	0	0	6.657	58.7		814	747
PAIA	ID to P51A	1,190	17	0	7,590	835	•	727	1,114	0	0	11,456	11	0	56.2	16.9
P 42A	Incl @ P51A ID to P51A	1.383	8	0	8.820	028	o	28	1.294	0	O	13.312	8	c	85.3	981
P 42B	Incl @ P51A						•	}		,)	100	3	•	3	e E
P 43A P 43B	ID to P51A Incl @ P51A	1,383	02	0	8,820	026	0	845	1,284	0	0	13,312	R	0	65.3	16.9
P 44A	ID to P51A Incl @ P51A	1,383	ଷ	0	8,820	970	0	845	1,284	0	0	13,312	20	0	65.3	16.9
P 45A	ID to P51A	1,383	&	0	8,820	026	0	845	1,284	0	0	13,312	8	0	65.3	16.9
84	Trace 600	086	14.0	0	5,757	998	°	410	485	0	0	8.248	41	C	42.2	20.2
P 47	ID to P46	083	14	0	5,757	998	0	410	485		0	8,248	4	0	42.2	20.5
P 51A P 51B	Trace 800 Incl @ P51A	1,383	19.9	0	8,820	026	0	845	1,294	0	o	13,312	19.9	0	65.3	16.9
P 52A P 52B	ID to P51A Incl @ P51A	1,383	&	0	8,820	026	0	845	1,294	0	o	13,312	&	0	65.3	16.9
P 53	ID to P46	930	14	0	5,757	999	0	410	485	0	o	8,248	4	0	42.2	20.2
P 54	ID to P46	830	14	0	5,757	999	0	410	485	0	0	8,248	4	0	42.2	20.2
P 55	ID to P46	088	41	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.5
P 56	ID to P46	930	14	0	5,757	999	0	410	485	0	0	8,248	11	0	42.2	20.2
57	ID to P46	830	14	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
P 58	ID to P46	930	14	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
P 59	ID to P46	830	14		5,757	999	0	410	485	0	0	8,248	14	0	42.2	50.2
P 60	ID to P46	930	14	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
S 79	Manual	1,080	•		485	•	•		•	-	•	1,565		•	5.3	5.3
P 80	Trace 600	1,638	148	•	11,449	1,001	0	226	Included	14	0	14,479	148		197.7	21.7
P 81	Sim to P80	•	150	1	8,460	740	0	278	0		0	9,488	150	-	182.4	27.1
10	BIN	86	728	•	14,000		pepnjouj	09.2	3,058		0	18,652	728		1,654.6	118.7
	Z Z	118	328	•	000'6	Included	Included	•	3,058	764	o	12,941	320			
	Manuei	131,383	•		1,482	Included	Included	1,679	Included	0	0	134,563				
P 116	BIN	•	35.0		0	0	0	0	866	0	0		38		40.3	22.5
	Sim to P80	616		0	834	2	٥	27	Included	٥	٥	1,550	•	0		
120	N N	٠	44	•	6,234	Included	Included	2,190	3,333	0	0	11,757	4		820.5	73.0
	Nis		324		0 0	pepnou	Included	3,459	Included	0 0	0 0	3,459	324	,		
T 121	Trace 600	5,787	53.0		11,475	1,511	0	920	8,588	0	0	25,990	83		141.7	28.6
T 124	Sim to T6	0	245		10,097	0	°	0	4,820	0	0	14.917	245		295.4	147.6
T 127	BIN	501	193	•	1,153	Eva		0	1,129		0	2,783	193		202.6	106
P 128	Trace 600	3,582	1,333		60,321			1,276	24,480	13,121	0	109,508	1,333	0	1,706.7	84.5
T 131	Sim to T6	•	49.7	•	5,036		٥	0	878	0	0	6,015	06	0	70.2	E 012

Table B-4 Baseline HVAC Energy Use Calculations Results

8	HAY	Primary Hea	Primary Heating Energy Use		Primary Cooling	aso (Secus Su	2		CO (BOIL)	200 (8	-		000			
ġ	Estimate	Electric	Propane	Fuel Oil	Compressor	T/Cond	dmd bu	Other Acc	SA Fans	Circ Pmp		Electric	Propane	Fuel Oil	Total	HVAC
	Basis	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	KWH/Yr	kWH/Yr	KWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	KWH/Y r	Mil BTU/Yr	Mil BTU/Yr	MBTU/Yr	k BTU/SF-Yr
S 144	Manual	•	52.5		0	0	0	103	315	0	0	418	53	-	53.9	7.5
S 146	Manual		258	•	0	0	0	617	1,847	0	0	2,464	256	-	264.3	65.4
	Sim to T6	0	146	0	6,035	0	0	0	1,633	0	0	7,668	146	0	172.3	144.1
T 156	Manual	•	•		823	0	0	0	0	0	0	823		,	2.8	1.6
1 158	Menuel	-			0	0	0	0	0	0	0	0		,		
Т	BIN		83.3		4,470	Included	0	0	1,408	0	0	5,878	83		103.3	45.9
Т	Sim to T161	٥	83.3	0	4,470	0	0	0	1,408	0	0	5,878	83	0	103.3	45.9
T	Sim to T161	0	83.3	0	4,470	0	0	0	1,408	0	0	5,878	88	0	103.3	45.9
T	Sim to T161	٥	83.3	0	4,470	0	0	0	1,408	٥	0	5,878	83	0	103.3	45.9
Г	Sim to T161	0	83.3	0	4,470	0	0	0	1,408	0	0	5,878	83	0	103.3	45.9
166	Sim to T161	٥	83.3	0	4,470	0	0	0	1,408	0	0	5,878	83	0	103.3	45.9
T 167	Sim to T161	0	83.3	0	4,470	0	0	0	1,408	0	0	5,878	83	0	103.3	45.9
S 168	Manual	No Heat	No Heat	No Heat	0	0	0	0	٥	٥	0	0	No Heat	No Heat	•	•
ī	Manual	No Heat	No Heat	No Heat	0	0	0	0	٥	0	0	0	No Heat	No Heat	•	
771 A	Trace 800	•	22.8	170	12,779	1,193	0	88	324	0	0	14,395	83		71.9	20.0
P 178	Sim to P177	0	98	0	15,974	1,491	0	124	404	0	0	17,993	98	0	147.6	41.0
S 182	Trace 600	0	51	0	5,067	200	0	92	pepnjouj	0	0	5,643	51	0	7.07	23.6
	BIN	-	119.5		7,546	Included	pepnioui	Included	1,131	0	0	8,677	120		149.1	1.11
P 190	Trace/Manual	163	•	310	34,548	Included	0	320	573	106	0	36,505	•	310	434.6	159.8
S 197	NI8	47,302	288.1		12,691	bebulad	Included	Included	3,670	00	00	16,361	268		536.2	65.7
S 198	BiN BiN		64		144	_		0	212	0	0	356	49		50.3	46.1
	ID to 207	308	0	1,867	75,217	_	0	7,118	188,682	931	0	272,346	0	1,867	2,796.5	68.2
त	incl (6) P207	· ·		2006		4	ľ	3,5	700 00	970	•	200		2, 3	1	
200	Irace/Manual Inct @ P206	0		che,			0	20,613	36,86	240	0	108,696		3,945	4,315.7	25/.4
P 207	Trace/Manual	966	•	1,867	75,217	Included	0	7,118	184,906	931	0	268,570		1,867	2,783.6	67.9
P 208	ID to 207	368		1,887	79,355	pepnjout	0	7,118	182,073	88	0	269,875		1,867	2,788.1	0.88
P 208A	Incl @ P207															
P 209	BIN/Manual	•	92		43,780	2,090	0	1,327	20,578	663	0	68,438	92		325.2	0.86
P 210	Trace 600	7,201		1,025	25,095	3,309	0	100	112,946	5,035	0	154,590		1,025	1,552.2	141.5
P 211	Manual	1,392			0	0	0	0	0	3	0	36,436	1,211	-	1,335.1	Y.
P 212	Sim to B219		1,071		12,612	0	0	26,022	8,041	2,413	0	49,087	1,071	,	1,238.6	139.1
P 219	Trace/Manual	110	430	•	4,548	_	0	9,384	2,900		0	17,812	430		490.8	152.8
P 229 P 229	Trace/Manual	308	0	1,867	79,355		0	7,118	199,067	1831	0	286,869	0	1,867	2,846.1	61.8
P 230	ID to P229	308	°	1,867	79,355	Included	0	7,118	188,682	283	0	276,484	0	1,867	2,810.6	68.6
S 235	Incl (g) P.229	968'8	48.4	0	8,936	728	0	205	°	0	0	18,805	46	0	110.6	36.9
7	ID to P240	8,936	46.9				0	205	0		0	18,805		0	111.0	37.0
Т	0000	8 036	1149			700										

Table B-4 Baseline HVAC Energy Use Calculations Results

Electric Propose Electric Propose Electric Propose Electric Propose Electric El	Fac	HVAC	Primary Hea	Primary Heating Energy Use		Primary Cooling	ng Energy Use	Se		Auxiliary Energy Use	gy Use		Total HVAC Energy Use	nergy Use		HVAC Energy per Floor SF	per Floor SF
Beain WWHYTY MWHYTY WWHYTY WWHYTY </th <th>Š</th> <th>Estimate</th> <th>Electric</th> <th>Propane</th> <th></th> <th>Compressor</th> <th>CT/Cond</th> <th>Cond Pmp</th> <th>_</th> <th>Г</th> <th></th> <th></th> <th>Electric</th> <th>Propane</th> <th>Fuel Oil</th> <th>Total</th> <th>HVAC</th>	Š	Estimate	Electric	Propane		Compressor	CT/Cond	Cond Pmp	_	Г			Electric	Propane	Fuel Oil	Total	HVAC
Trace 600 1,334 508 20,210 2,336 10 3,423 3,550 9 0 3,024 5,086 1,330 1,334 1,335 1,		Basis	kWH/Yr	Wil BTU/Yr	Mil BTU/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	KWH/Yr	kWH/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	MBTU/Yr	k BTU/SF-Yr
Trace 600 8 898 38 0 6 898 728 0 265 Included 0 18,805 38 Trace 600 12,231 115,231 155 2,418 0 2,451 125,528 4,009 0 18,805 38 Trace 600 8,536 33 0 8,638 728 0 205 0 0 18,805 33 Di to P240 8,636 33 0 8,636 728 0 205 0 0 18,805 33 Di to P240 8,636 33 0 8,636 728 0 205 0 0 18,805 33 Di to P240 8,636 33 0 8,636 728 0 205 0 18,805 33 BIN 4,637 1,03 1,03 1,044 Included Included 1,1644 3,55 4,138 2,451 0 18,205 3,54 1,22 BIN	S 238	Trace 600	1,336	809	0	20,210	2,396	0	3,423	3,650	O2	0	31,024	508	0	613.8	42.2
Trace 600 12,231 153 153 153 153 154 155 125,528 4,000 10,000 16,297 153 1	P 240	Trace 600	8,936	38	0	8,936	728	٥	3 02	Included	0	0	18,805	38	0	102.4	34.1
Di to P240 8,896 339 0 8,996 728 0 205 0 0 0 0 18,805 33 33 39 39 39 39 39 3	S 241	Trace 600	12,231	153	0	16,565	2,186	0	2,451	125,528	4,009	0	162,971	153	0	709.3	70.9
Di De P240 8,936 33 0 8,836 728 0 205 0 0 0 18,805 33 33 33 33 33 33 33	\$ 243	ID to P240	8,936	88	0	8,936	728	0	205	0	0	0	18,805	33	0	97.2	32.4
10 to P240 6,636 38 39 0 6,636 726 0 205 0 0 0 0 16,805 38 38 38 38 38 38 38 3	S 244	ID to P240	8,936	33	0	8,936	728	0	205	0	٥	0	18,805	33	0	97.2	32.4
Di to P240 8,636 38 0 6,936 728 728 0 0 0 0 0 0 0 0 0	\$ 246	ID to P240	8,936	33	0	8,836	728	0	205	٥	0	0	18,805	88	0	97.2	32.4
BIN 4,520 - 4,480 Included Included 1,253 3,621 2,451 0,21 2,7085 - 9 BIN 4,577 - 403 700 Included Included 1,160 1,634 0 10,742 - Manual 4,577 - 1,010 Included Included 1,684 0 10,742 - 1 Manual 1,02 - 1,010 Included Included 1,684 0 10,777 - 1 Manual 5,02 5,102 - 1,010 Included Included 1,684 0 10,777 - 1 5 1 5 1 5 1 <t< td=""><td>S 247</td><td>ID to P240</td><td>8,936</td><td>38</td><td></td><td>8,936</td><td>728</td><td>0</td><td>205</td><td>0</td><td>0</td><td>0</td><td>18,805</td><td>38</td><td>0</td><td>102.4</td><td>34.1</td></t<>	S 247	ID to P240	8,936	38		8,936	728	0	205	0	0	0	18,805	38	0	102.4	34.1
BIN 4,577 - 403 700 Included Included 2,150 1,634 0 10,742	P 252	BIN	14,280	•	918	4,480	Included	hepnipul	2,253	3,621	2,451	0	27,085		919	1,011	82.2
Di to P 252 Pair College Pair	P 256	BIN	4,577		403	7007	Included	pepnjouj	2,150	1,681	1,634	0	10,742		403	440	83.0
Marnual 143 143 145	P 259	ID to P 252	9,102	٠	1,010	0	Included	Included	3,686	4,138	2,451	0	18,377		1,010	1,076	78.7
Di to P240 8,836 57 0 8,836 728 0 265 0 0 0 18,805 57 7 7 7 7 7 7 7 7	S 283	Manual	•	143	•	0	•	•	154	355			809	143	,	145	36.1
BiN/Manual SóS 132 18,628 2,832 436 437 437 437 437 441,756 441,756 441,756 441,756 441,756 441,756	S 286	ID to P240	8,936	57		8,936	728	0	502	0	0	0	18,805	57	0	121	40.3
Di to P240 8,936 57 0 8,936 728 0 205 0 0 0 18,805 57 575 575 1,084 57 575 575 1,084 575 575 1,084 575 575 1,084 575 575 1,084 575 575 1,084 575 575 1,084 575 5	P 287	BiN/Manual	205	132	-	18,628	2,832	0	436	31,504			53,904	132		316	58.5
Trace 600 4,806 1,064 - 12,581 1,554 0 772 12,826 2,825 0 150,755 1,064 - Trace 600 3,276 490 0 673 83,633 24 0 66,071 490 490 Trace 600 1,696 2,189 0 1,691 490,496 15,026 0 73,890 2,189 Trace 600 1,696 2,189 0 5,894 60,841 0 65,034 352 - Menual 19 - - 2,597 2,897 0 5,894 60,841 0	S 288	ID to P240	8,936	57	0	8,936	728	0	205	0	0	0	18,805	25	0	121	40.3
Trace 600 3,276 490 0 7,727 738 0 673 83,633 24 0 96,071 490 490 Trace 600 11,696 2,189 0 16,905 0 1,891 490,498 15,026 0 77,189 2,189 2,189 0 2,894 60,841 0 66,841 0 66,841 0 66,841 0 66,841 0 66,841 0<	S 280	Trace 600	4,806			12,581	1,554	0	723	128,266	2,825	0	150,755	1,064		1,579	106.3
Trace 600 11,696 2,199 0 167,874 16,905 0 1,891 490,498 15,026 0 703,890 2,199 <t< td=""><td>\$ 291</td><td>Trace 600</td><td>3,276</td><td>490</td><td></td><td>7,727</td><td>738</td><td>0</td><td>673</td><td>83,633</td><td>24</td><td>0</td><td>140'98</td><td>490</td><td>0</td><td>818</td><td>110.8</td></t<>	\$ 291	Trace 600	3,276	490		7,727	738	0	673	83,633	24	0	140'98	490	0	818	110.8
Trace 600 154 352 - 25,048 2,987 0 5,984 60,841 0 96,034 352 - Manual 19 - <td>P 295</td> <td>Trace 600</td> <td>11,696</td> <td>2,199</td> <td></td> <td>167,874</td> <td>16,905</td> <td></td> <td>1,891</td> <td>490,498</td> <td>15,026</td> <td>0</td> <td>703,890</td> <td>2,199</td> <td>0</td> <td>4,602</td> <td>8.86</td>	P 295	Trace 600	11,696	2,199		167,874	16,905		1,891	490,498	15,026	0	703,890	2,199	0	4,602	8.86
Manual 19 - 0 0 0 0 0 0 19 -<	P 301	Trace 600	<u>2</u>	352	1 1	25,048	2,997	0	5,994	60,841	0	0	95,034	352	•	678	62.6
SiN 283 66 Included 0 0 0 Included 0 0 0 349 373,367 14,375 16,946 1,283,865 68,842 0 141,738 2,152,015 92,930 0 4,111,758 14,375	P 642	Manual	6	•		0	0	0	0	0	0	0	19			90.0	0.1
373,367 14,375 16,946 1,283,865 68,842 0 141,738 2,152,015 92,930 0 4111,758 14,375	\$ 2201	-	283			99	Included	0	0	Included	0	0	349		-	1.19	
	Totals		373,367	14,375		1,283,865	68,842	0	141,738	2,152,015	92,930	0	4,111,758	14,375	16,946	45,355	72.5

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	Heating System			12	1		
No.	Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Eff
	%	%	%	%	%	%	%
Г6	80.0%	•	8.0%	3.0%	2.0%	1.0%	66.0%
9 41A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 41B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
242A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 42B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 43A	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 43B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 44A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 44B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 45A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 45B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 46	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 47	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 51A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 51B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 52A	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 52B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 53	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 54	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 55	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 56	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 57	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
² 58	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
² 59	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
- 60	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
S 79	•	•	•	•	-	•	•
P 80	84.5%	-	8.0%	4.0%	2.0%	2.0%	68.5%
P 81	85.0%	-	4.0%	3.0%	2.0%	2.0%	74.0%
P 101	82.9%	•	6.0%	4.0%	2.0%	3.0%	67.9%
	Same	Same	Same	Same	Same	Same	Same
		•		•	•	-	•
	Included	Included	Included	Included	Included	Included	included
P 116	85.0%	-	4.0%	3.0%	2.0%	2.0%	74.0%
	7.15 Btu/W-Hr	-		•	•	•	•
T 120	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
	80.0%	-	6.0%	4.0%	2.0%	2.0%	66.0%
	75.0%	-	10.0%	4.0%	2.0%	3.0%	56.0%
Γ 121	75.0%	•	4.0%	3.0%	2.0%	2.0%	64.0%
Г 124	80.0%	•	8.0%	3.0%	2.0%	2.0%	65.0%
Γ 127	80.0%	•	8.0%	4.0%	2.0%	2.0%	64.0%
128	89.0%	-	8.0%	4.0%	2.0%	2.0%	73.0%
Г 131	80.0%	-	10.0%	4.0%	2.0%	3.0%	61.0%
S 144	80.0%	•	6.0%	3.0%	2.0%	2.0%	67.0%
S 146	80.0%	•	8.0%	5.0%	2.0%	3.0%	62.0%
T 149	80.0%	-	8.0%	3.0%	2.0%	2.0%	65.0%
T 156	•	-	•	-	-	•	•
T 4 E 0	-	•	•	-	-	•	
Γ 158	-	-	4.051	0.004	4.004	4.00/	70.00/
	80.0%		1 4.0%	2.0%	1.0%	1.0%	72.0%
T 161 T 162	80.0%	· · · · · · · · · · · · · · · · · · ·	4.0%	2.0%	1.0%	1.0%	72.0%

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

No.	eating System Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Ef
110.	%	%	%	%	%	%	%
Г164	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
Г 165	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
166	80.0%	_	4.0%	2.0%	1.0%	1.0%	72.0%
167	80.0%	_	4.0%	2.0%	1.0%	1.0%	72.0%
3 168	-	-	-		-	-	-
172		•	-	-		-	
177	78.4%		5.0%	3.0%	2.0%	2.0%	66.4%
2 178	80.0%	3.0%	5.0%	3.0%	2.0%	2.0%	65.0%
	77.0%	2.0%	5.0%	3.0%	2.0%	2.0%	63.0%
S 182		2.076	5.0%	3.0%	2.0%	2.0%	66.0%
S 186	78.0%		5.0%	3.0%	2.0%	2.0%	73.7%
190	85.7%	-		5.0%	2.0%	2.0%	69.0%
3 197	86.0%		8.0%	3.0 %	2.076	2.0%	•
S 198	80.0%	-	5.0%	3.0%	2.0%	2.0%	68.0%
205	87.7%		7.0%	4.0%	2.0%	3.0%	71.7%
P 205A	87.7%		7.0%	4.0%	2.0%	3.0%	71.7%
206	86.8%	-	7.0%	4.0%	2.0%	3.0%	70.8%
207	87.4%		7.0%	4.0%	2.0%	3.0%	71.4%
207A	87.4%		7.0%	4.0%	2.0%	3.0%	71.4%
	88.1%		7.0%	4.0%	2.0%	3.0%	72.1%
208		_	7.0%	4.0%	2.0%	3.0%	72.1%
P 208A	88.1%		6.0%	5.0%	2.0%	3.0%	61.2%
209	77.2%	<u>-</u>	4.0%	3.0%	2.0%	2.0%	70.1%
P 210	81.1%		5.0%	3.0%	2.0%	2.0%	65.2%
P 211	77.2%	<u> </u>	6.0%	4.0%	2.0%	3.0%	66.7%
P 212	81.7%	- : -	6.0%	3.0%	1.0%	2.0%	67.0%
P 219	79.0%		7.0%	4.0%	2.0%	3.0%	71.9%
P 229	87.9%	-	1	4.0%	2.0%	3.0%	71.9%
P 229A	87.9%	•	7.0%		2.0%	3.0%	71.2%
P 230	87.2%	-	7.0%	4.0%		3.0%	71.2%
P 230A	87.2%	-	7.0%	4.0%	2.0%		
S 235	77.0%	<u> </u>	4.0%	3.0%	1.0%	2.0%	67.0%
S 236	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 237	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 238	81.9%	-	5.0%	4.0%	2.0%	2.0%	68.9%
P 240	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
S 241	83.6%		8.0%	4.0%	2.0%	3.0%	66.6%
	•	-	-	-	-	-	0.0%
S 243	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
S 244	77.0%	·	4.0%	3.0%	1.0%	2.0%	67.09
S 246	77.0%	•	4.0%	3.0%	1.0%	2.0%	67.0%
S 247	77.0%		4.0%	3.0%	1.0%	2.0%	67.09
P 252	84.0%		4.0%	3.0%	2.0%	2.0%	73.0%
P 256	82.7%		4.0%	3.0%	2.0%	2.0%	71.7%
P 259	84.9%		4.0%	3.0%	2.0%	2.0%	73.99
S 283	80.0%	 .	4.0%	2.0%	2.0%	3.0%	69.09
	-	<u> </u>		•	•	-	-
S 286	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.09
P 287	75.0%		4.0%	3.0%	2.0%	2.0%	64.09
S 288	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.09

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	Heating System	Losses					
No.	Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Eff
	%	%	%	%	%	%	%
S 290	80.8%	-	8.0%	4.0%	2.0%	3.0%	63.8%
	-	-	•	-	-	-	-
S 291	78.8%	3.0%	7.0%	4.0%	2.0%	3.0%	59.8%
P 295	77.7%	-	8.0%	5.0%	2.0%	3.0%	59.7%
P 301	84.0%	•	6.0%	3.0%	2.0%	2.0%	71.0%*
	-	-	-	-	•	-	•
P 642	•	-	. -	-	-	•	-
S 2201	-	-	•	-	-	-	-

Table B-6 omestic Hot Water Consumption Rate Data

			Domestic Hot	Domestic Hot Water Consumption Rate Data	ion Rate Data	
Function	Description of Usage	Gallons per Capita Day	oita Day	Lo-Flow GPCD's		Basis of
Sode		Non-Cooking	Cooking	Non-Cooking	Cooking	GPCD Data
	Offices	2.00	00:0	1.10	0.00	TM 5-810-5, Chapter 4.
2	Shops and Warehouses	2.00	00:0	3.50	0.00	TM 5-810-5, Chapter 4.
2.1	2.1 Commercial Laundries	Separate Calculations	lations	Separate Calculations	lations	
8	3 Barracks & Quarters w/o Dining	30.00	00:00	14.93	00.00	TM 5-810-5, Chapter 4.
3.1	3.1 Detached Latrine with Bathing	24.00	00.0	8.93	00.0	TM 5-810-5, Chapter 4.
*	Barracks & Quarters with Dining	30.00	3.33	14.93	3.33	TM 5-810-5, Chapter 4.
2	5 Recreation & Gyms w/o Bathing	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
5.1	Recreation & Gyms with Bathing	12.00	3.33	4.58	3.33	TM 5-810-5, Chapter 4.
9	6 Theaters / Community Facilities	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
7	7 Dining Facilities, all uses	0.25	3.33	0.18	3.33	TM 5-810-5, Chapter 4, assumes 1/8 Code 1 restroom usage
80	Base Exchanges & Stores	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
8.1	8.1 Commissaries	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
6	9 Clube, Officers, NCO, Eni PN	2.00	3.33	1.10	3.33	TM 5-810-5, Chapter 4, allowance for hand & bar washing
2	10 Family Housing (Total incl Cooking)	40.00	Included	17.80	Included	TM 5-810-5, Chapter 4.
11.1	11.1 Schools w/o Bathing	5.00	3.33	1.63	3.33	TM 5-810-5, Chapter 4.
11.2	11.2 Schools with Bathing	11.00	3.33	3.73	3.33	TM 5-810-5, Chapter 4, Code 11.1 plus assume 1/2 shower daily.
11.3	11.3 Child Development Centers	8.00	3.33	2:00	3.33	Added usage from Function Code 11.1 for diapering, etc.
12	12 Medical Facilities, Clinics	20.00	3.33	20.00	3.33	TM 5-810-5, Chapter 4, assumed less than in-patient care
12.1	12.1 Medical Facilities, Hospitals	120.00	3.33	120.00	3.33	Per Patient: TM 5-810-5, Chapter 4.
13	13 Multiple Usage Buildings	Separate Calculations	ulations	Separate Calculations	lations	

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

	DHW Pla	III EIIICIE	ilicy		05 4.5	Canacal	Die	Mad
No.		Auxilliar	Radiant	Convection	Shut-Down	General		Net Eff
	Eff				A A17	- 0.007	Losses	
6	70.0%	-	4.0%	3.0%	2.0%	2.0%	11.0%	59.0
41A	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
41B	76.1%	•	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
42A	76.1%		4.0%	2.0%	1.0%	1.0%	8.0%	68.1
42B	76.1%		4.0%	2.0%	1.0%	1.0%	8.0%	68.1
43A	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
43B	76.1%	•	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
44A	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
9 44B	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
45A	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
45B	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
46	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
47	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
51A	76.1%	-	4.0%	2.0%	1.0%	1.0%		68.1
9 51B	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
52A	76.1%		4.0%	2.0%	1.0%	1.0%		68.1
52B	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
53	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
54	76.1%	-	4.0%	2.0%	1.0%	1.0%		68.1
55	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
56	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
57	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
58	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
59	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
60	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
79	-	-	-	-		-	-	
80	-	-	-	-	•	•	-	
9 81		-	-	-		_	-	
P 101	70.0%	-	8.0%	5.0%	2.0%	3.0%		52.0
	70.0%	-	4.0%	4.0%	2.0%	2.0%		58.0
	70.1%	-	4.0%	3.0%	2.0%	2.0%		59.1
	70.8%	-	4.0%	3.0%	1.0%	1.0%	9.0%	61.8
P 116		-	-	-			-	
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0
Γ 120	75.2%	-	6.0%		2.0%	3.0%		60.2
	70.1%	-	6.0%		2.0%	3.0%	15.0%	55.1
	0.0%	0.0%			0.0%	0.0%	0.0%	0.0
Γ 121	70.0%	-	6.0%		2.0%	2.0%	14.0%	56.0
	13.5/9	-	3.576	-	•	•	0.0%	
Г 124	70.0%	_	4.0%	4.0%	2.0%	2.0%		58.0
T 127	70.1%	-	4.0%		2.0%	1.0%		60.1
P 128	75.2%	-	5.0%		2.0%	2.0%	12.0%	63.2
Γ 131	70.0%	-	4.0%			2.0%		58.0
S 144	70.1%	-	6.0%		2.0%	2.0%	14.0%	56.1
S 146	70.178	-				-	-	
T 149	70.0%		4.0%	4.0%	2.0%	2.0%	12.0%	58.0
T 156	, , 0.0 /8		7.070	7.5%			-	
1 130	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
T 158			J.U 76	0.076	0.070	3.070	3.5,9	
T 161	-	•				-		
	•	•						-
T 162 T 163	-	•	-	-		-	-	

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

No.	Firing	ant Efficie	Radiant	Convection	Shut-Down	General	Plant	Net
140.	Eff	Auximai	naulaik	OONVECTION	Ond Down	Gonora	Losses	Eff
T 164	-	•	•	•	-	-	-	-
T 165	-	-	•	•	•	_	-	
T 166	-	-		•	•	-	-	
T 167	-			•	•	•	-	•
S 168		-					-	
T 172	-			•			-	
P 177	-	-	-		-	-	-	
P 178	80.0%		4.0%	3.0%	2.0%	1.0%	10.0%	70.0
S 182	- 00.070	-	,		-		-	
S 186		_		-		-		
P 190						•		
S 197					-			
3 197	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0
S 198	0.076	0.0%	J.U 76	0.076	0.076	3.570		- 0.0
P 205	97.79/	-	7.00	4.0%	2.0%	3.0%	16.0%	71.7
_	87.7%	-	7.0%	4.070	2.070	J.U /a	10.078	7 1.7
P 205A	00.00	•	7.00	4.00/	2.0%	3.0%	16.0%	70.8
P 206	86.8%	- 0.004	7.0%	4.0%				
D 00=	Dish W	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
P 207	87.4%	-	7.0%	4.0%	2.0%	3.0%	16.0%	71.49
P 207A	-	-	-	•	-	-	10.00	
P 208	88.1%	-	7.0%	4.0%	2.0%	3.0%	16.0%	72.19
P 208A	-	-	-	-	-	-	-	
P 209	-	•		-	•		40.55	
P 210	70.0%	-	5.0%	3.0%	2.0%	2.0%	12.0%	58.0
P 211	81.0%	-	6.0%	4.0%	2.0%	3.0%	15.0%	66.0
P 212	70.1%	-	6.0%	4.0%	2.0%	2.0%	14.0%	56.19
P 219	75.9%	-	5.0%	3.0%	1.0%	2.0%	11.0%	64.9
P 229	87.9%	-	7.0%	4.0%	2.0%	3.0%	16.0%	71.99
P 229A	•	-	•	-			-	-
P 230	87.2%	-	7.0%	4.0%	2.0%	3.0%	16.0%	71.29
P 230A	-	-	-	•	•		-	-
S 235	-		-	-	•	•	-	-
S 236		•	-	-	-	-	- 1	-
S 237	-	-	-	-	-	-	•	-
S 238	80.3%	_	4.0%	3.0%	2.0%	2.0%	11.0%	69.39
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.09
P 240				2.0,4	-	-	-	-
S 241			_	-		-	-	-
7 .	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.09
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.09
S 243			- 0.076	0.074	0.074	- 0.074		-
S 244	•	-			-			
	•			-	-			
S 246	•			-				
S 247	-			-				
P 252	-	-	-	-	-		-	
P 256	-				-			-
P 259	-	-			-			
S 283	-	-	-	-			-	
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.09
S 286	-	-	-	-	-	-		
P 287	73.0%	_	7.0%	4.0%	2.0%	2.0%	15.0%	58.09

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	DHW PI	ant Efficie						
No.	Firing	Auxilliar	Radiant	Convection	Shut-Down	General	Plant	Net
	Eff						Losses	Eff
S 290	70.4%	•	8.0%	4.0%	2.0%	3.0%	17.0%	53.4%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
S 291	-		•	•	-	•	-	-
P 295	77.7%		8.0%	5.0%	2.0%	3.0%	18.0%	59.7%
P 301		•	•	•	-	-	-	-
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
P 642	75.2%	•	7.0%	4.0%	2.0%	3.0%	16.0%	59.2%
S 2201	- 1	-	-	-	_	-	-	-

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

Fac		Actual	DWH: Base	seline Energy Use	ly Use	55	Degree F CW Temp	3W Temp	Added Losses	cosses	Baseline DHV	Baseline DHW Energy Use	
Š	M	Temp	Gal/Capita	ta-Day	Lo-Flow	Adjusted GPCD's	3PCD's	DHW Usage	Mil BTU/Yr) <u>/</u>	Fuel Oil	Propane	Electric
		Deg F	Normal	Cooking	Fittings	Normal	Cooking	Mil BTU/Yr	Tank	Pipe	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
9	3	135	40.00	Included	Yes	17.80	Included	12.98	3.1	9.5		43.30	
P 41A	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 41B	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	
P 42A	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	1	32.63	•
P 42B	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 43A	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4		32.63	•
P 43B	4	140	40.00	Included	Yes	17.80	Included	18.39	4.1	2.4		32.63	•
P 44A	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 44B	4	140	40.00	Included	Yes	17.80	pepnjou	18.39	1.4	2.4	•	32.63	
P 45A	4	140	40.00	Included	Yes	17.80	pepnjouj	18.39	1.4	2.4	•	32.63	•
P 45B	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	-
P 46	4	145	40.00	Included	Yes	17.80	Included	18.39	1.5	2.4	,	34.57	•
P 47	4	145	40.00	Included	Yes	17.80	Included	18.39	1.5	2.4		34.57	•
P 51A	4	140	40.00	三	Yes	17.80	Included	18.39	1.4	2.4		32.63	-
P 51B	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	-
P 52A	4	140	40.00	=	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 52B	4	140	40.00	Included	Yes	17.80	pepnjouj	18.39	1.4	2.4	•	32.63	-
P 53	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	1	32.63	•
P 54	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	1
P 55	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	-	32.63	•
P 56	4	140		Included	Yes	17.80	Included	18.39	1.4	2.4	1	32.63	1
P 57	4	140		_	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 58	4	140	40.00	Included	Sə	17.80	Included	18.39	1.4	2.4	•	32.63	
P 59	4	140	40.00	Included	Yes	17.80	Included	18.39	1.4	2.4	•	32.63	•
P 60	4	140	40.00	Included	Yes	17.80	Included			2.4	•	32.63	•
S 79	2	•			A A	0.00	0.00	0.00	0.0	0.0	1		•
P 80	9	135			S N	0.50	3.33			8.9	1	•	20,692
P 81	350	135	0.50	3.33	S N	0.50	3.33		5.2	1.3	-	•	43,067
P 101	11	160			Ž	0.25	3.33		5.2	27.1	1	111.85	•
	6	140	2.00	3.33	8 N	2.00	3.33	7.29	3.3	1.0	•	29.87	•
	9	140	30.00	00.00	Yes	14.93	0.00	22.68	5.6	9.3	•	101.48	•
	6	140	4	Inclu	Yes	17.80	Included	41.39	2.4	19.2	•	110.91	•
P 116	ου σο 	120	2.00	00:00	<u>8</u>	2.00	0.00	1.52	0.4	0.3	•		826
T 120	7	110	2.00		S	2.00	0.00		3.9	10.8	1	28.34	•
	7	140		3.33	8	30.00	3.33	60.28	6.5	16.8	•	151.49	•
_		_		_									•

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

Fac	-		DWN. Dasel	aen (Riginal Ose	aso Ar	3	J	2	_	-			
<u>. </u>	N. C	Temp	Gal/Capita-	ta-Day	Lo-Flow	Adjusted GPCD's	3PCD's	DHW Usage		الار	Fuel Oil	Propane	Electric
1		1997	Normai	Cooking	Fittings	Normal	COOKING	MI D10/11	A S	ed L	MII DIO/TI	MII D 10/11	KWIN/11
	g '	42	90.9	00.0	2 2	2.00	0.00	5.43	9.0	0.3		2	8,599
-	4	160	7	Included	S S	40.00	Included	41.34	1.5	9.9		54.20	•
	10	128	30.00	00.0	Yes	14.93	0.00	22.68	5.5	33.4	•	126.91	•
<u> </u>	80	140	30.00	3.33	χes	14.93	3.33	377.29	2.4	49.8	•	680.12	•
-	4	135	40.00	Included	٥	40.00	Included	41.34	3.1	6.9		46.80	٠
S 144	Not	¥	0.50	3.33	2	0.50	3.33	00:00	0.0	0.0		00.00	-
S 146	2		00'0	0.00	NA	00'0	0.00	00.00	0.0	0.0	•		•
T 149	4	135	40.00	Included	2	40.00	Included	38.90	3.1	2'9	•	46.80	,
156	e c	140	5.00	00.0	°N	5.00	0.00	1.63	9.0	0.0	•	,	626
158			000	000	AN	000	000	8	0	00			'
+	42		8 8	800	Y A	800		800	200				
162	1 =		800	000	¥	000	000	000	0.0	0.0			
╁	¥	•			¥			0.00	0.0	0.0	•		•
	¥	•	•		¥	•		00.0	0.0	0.0		•	•
\vdash	¥	5		-	ž			0.00	L	0.0	-	•	•
1 166	Y.	•	•	-	Ϋ́	-	٠	0.00	Ц	0.0	1	•	•
167	¥		-		N	•	- [0.00		0.0	•	•	•
Н	Not		0.00		AN	0.00				0.0	•	•	,
T 172		•	0.00		¥	0.00			_	0.0	•	•	-
	4		0.00		¥	0.00	_			0.0	1	•	•
	43	110	8.00		Yes	2.00				11.6	•	56.66	
S 182	25	110	0.50		S N	0.50				0.4	•	•	3,585
S 186	3	•	0.00		Ä	0.00				0.0	•	•	
P 190	10	125	0.50		Yes	0.35			1.3	0.1	1	•	2,726
197	2	125	2.00	00'0	No	2.00	0.00	1.09		0.3	•	•	931
_	2												
S 198	2		0.00		¥	0.00				0.0	'	•	1
P 205	06	140	2.00		Yes	1.10		_		42.4	84.57	•	•
P 205A	10	135	2.00		Yes	1.10		1.19	0.0	0.5	•	•	647
P 206 5	563	140	0.25		Хes	0.18		509.80	57.8	74.0	905.84	•	•
5	563	180	0.00		S.	0.00		0.00	\dashv		•	•	'
	80	145	30.00		Yes	14.93		₩ —	_	55.5	553.26	•	•
	10	130	200		Yes	1.10			\dashv	0.2		•	2776
_	06	140	30.00		Yes	14.93	00'0	20	_	52.5	575.93	,	•
208A	10	140	2.00	00.00	Yes	1.10	0.00	1.19	0.8	0.2	1	,	606

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

	Electric	kWH/Yr	67,115	1			•	•	688	٠	794	•	•	•	•	•	•	3,009	• •		-	•	•	3,715	4,980	3,440		٠	•	•	•	-	•	•	1,898	, ,
V Energy Use	Propane	Mil BTU/Yr	-	-	00.00	22.94	70.07		•	•		•	•	•	45.74	35.60	-	1		•	•	•	•	ı		•	•	ı	61.52	1	62.38		•	819.77	•	•
Baseline DHW Energy Use	Fuel Oil	Mil BTU/Yr	•	2,023.92	1	•		212.14	•	456.96	1	-	•	•		1	•	ı		•	•	•	•	•		•	1	•	•	,			,	-	•	
		Pipe	5.4	52.2	0.0	3.6	9.5	46.5	0.2	45.9	0.2	0.0	0.0	0.0	19.3	16.7	0.0	5.4		0.0	0.0	0.0	0.0	1.0	0.1	1.0	0.0	0.0	10.9	0.0	14.2		0.0	98.8	9.0	
Added Losses	Mil BTU/Yr	Tank	1.2	6.5	0.0	1.7	4.0	10.8	9.0	10.8	9.0	0.0	0.0	0.0	9.6	0	0.0	9.0		0.0	0.0	0.0	0.0	2.9	13.4	1.2	0.0	0.0	3.3	0.0	6.1		0.0	12.8	0.5	
W Temp	DHW Usage	Mil BTU/Yr	121.18	1,115.18	0.00	5.03	24.03	63.51	1.19	181.45	1.19	00.00	0.00	00.0	5.97	(10.96)	00.00	3.26		0.00	0.00	0.00	0.00	6.51	2.17	6.51	0.00	00.0	10.10	00.00	8.14		0.00	258.57	3.34	
Degree F CW Temp	PCD's	Cooking	3.33	3.33	3.33	3.33	3.33	00.00	0.00	0.00	0.00	0.00	0.00	00.00	0.00	0.00	00'0	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.33	0.00	00.00		0.00	0.00	0.00	
55	Adjusted GPCD's	Normal	1.10	120.00	0.50	0.35	4.58	14.93	1.10	14.93	1.10	00.00	0.00	00.0	1.10	20.00	00'0	2.00		0.00	00.00	0.00	0.00	5.00	2.00	5.00	0.00	0.00	1.10	0.00	5.00		0.00	14.93	1.10	
IV Use	Lo-Flow	Fittings	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	NA	NA	NA	Yes	No No	AN	ΑN		¥.	AN	AN	٨N	No	No	No	N N	NA	Yes	ΑX	Š		Y V	Yes	Yes	
DWH: Baseline Energy Use	a-Day	Cooking	3.33	3.33	3.33	3.33	3.33	0.00	0.00	0.00	0.00	0.00	0.00	00.0	0.00	0.00	0.00	00.00		00.0	0.00	00'0	00'0	00.0	00'0	00'0	00'0	00'0	3.33	00.0	00'0		0.00	0.00	00.00	
DWH: Bas	Gal/Capita-Day	Normal	2.00	120.00	0.50	0.50	12.00	30.00	2.00	30.00	2.00	0.00	0.00	0.00	2.00	20.00	0.00	2.00		0.00	00'0	0.00	0.00	5.00	5.00	2.00	0.00	0.00	2.00	0.00	5.00		0.00	30.00	2.00	
Actual	Temp	Deg F	145	140	٧	130	120	130	120	129	130	٠	•	•	122	160	•	120		•	1	•	•	120	135	125	1	•	140	•	135		•	128	132	
	Ā		180	35	¥	6	8	28	10				\Box	N A	20	0	12	15	00	12	72	12	12	12	4	12	- 0	Š	15	¥	15	0	9	114	20	00
Fac	Š		P 209	P 210	P 211	P 212	P 219	P 229	P 229A	P 230	P 230A	S 235	\$ 236	S 237	S 238		P 240	S 241		\$ 243	S 244	\$ 246	\$ 247	P 252	P 256	P 259	S 283	S 286	P 287	\$ 288	\$ 290		S 291	P 295	P 301	

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

Fac		Actual	DWH: Base	seline Energy Use	y Use	55	Degree F (55 Degree F CW Temp	Added	sesso	Baseline DHV	Added Losses Baseline DHW Energy Use	
Š	N N	Temp	Gal/Capita		Lo-Flow	Lo-Flow Adjusted GPCD's		DHW Usage	Mii BTC	الخد	Fuel Oil	Propane	
		Deg F	Normal	Cooking	Fittings	Normal	Normal Cooking	Mil BTU/Yr Tank	Tank	Pipe	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
P 642	25	130	24.00	00'0	Yes	8.93	00.0	33.91	2.5	15.6	-	116.70	1
S 2201	1	•	00'0	00'0	NA	0.00	00'0	00'0		0.0		•	•
Totals			SUBTOTA	(LS, Million	LS, Million BTU / Year (MW-Hr/Yr)	(MW-Hr/Yr		4,061	265	860	4,813	3,657	169,376
Gallons			SUBTOTAL	ALS, Gallons / Year	s/Year						34,698	39,738	

TABLE B-9 BUILDING BASELINE LIGHTING ENERGY USE SUMMARY

Fea	T	Area	1 = BLDG	USAGE	Default	ON-HOUR	CONNECTE	Baseline
Fac	Installation Name	(SF)	USAGE	FACTOR		PER	LOAD	Energy
No.	Installation Name	(37)	FACTORE		Watts/SF	YEAR	Watts	kWH/Yr
T 6	Family Housing NCO & Enl	1,090	1	25%	1.5	874	1,635	2,381
P 41A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
	Family Housing NCO & Enl	1,937	 i	25%	1.5	874	2,906	4,230
P 41B P 42A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 42B	Family Housing NCO & Enl	1,937	1 1	25%	1.5	874	2,906	4,230
P 43A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
	Family Housing NCO & Enf	1,937	1	25%	1.5	874	2,906	4,230
P 43B	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 44A			1	25%	1.5	874	2,906	4,230
P 44B	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 45A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 45B	Family Housing NCO & Enl	1,937				874	3,134	4,562
P 46	Family Housing CG & WO	2,089	1 -	25%	1.5			4,562
P 47	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,382
P 51A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	
P 51B	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 52A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 52B	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 53	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 54	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 55	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 56	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 57	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 58	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 59	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 60	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
S 79	Post Office, Main	1,000		25%	2.5	374	1,224	764
P 80	Exchange, Main Retail	9,093		25%	2.5	437	13,921	10,134
P 81	Theater with Dressing Rm's	6,719		25%	2.5	164	8,430	2,301
P 101	Open Din Cons (Hacienda)	6,171	1	25%	2.5	328	15,428	8,423
	Club (Bar)	3046	1	25%	2.5			0
	Hacienda, East Rooms	4,721		25%	2.0			0
	Hacienda, West Rooms	8,273		25%	1.5			0
P 116	Exchange Service Station	1,126		25%	1.0	710	2,680	3,170
	(Non-shop areas)	662		25%	2.5			0
T 120	Fire Station - Office	3,636		90%	2.5	4,659	28,365	148,678
	Fire Station - Dorm	2,653		60%	2.0			0
	Fire Station - Garage	4,949		90%	1.0			0
T 121	Bowling Center	4,952		90%	2.5	2,912	7,204	23,600
		628		90%	1.0			0
T 124	Family Housing LC & MJ	2,001	1	25%	1.5	874	3,002	4,370
T 127	Officers Quarters Military	2,250		60%	2.0	3,203	2,560	8,946
P 128	Officers Quarters Military	20,196	1	60%	2.0	3,203	40,392	141,146
T 131	Family Housing CG & WO	998	1	25%	1.5	874	1,497	2,180
S 144	Gymnasium	7,172		80%	2.5	0	2,841	0
S 146	FE Facility	4,042		90%	1.0	1,872	2,459	5,179
T 149	Family Housing NCO & Enl	1,196		25%	1.5	874	772	1,124
T 156	FE Facility - Shop	1,753		90%	1.0	1,872	4,362	9,186
	FE Facility - Office	497		90%	2.5			0
T 158	Vehicle Storage	1,859		90%	1.0	0	666	0
	Admin General Purpose	2,250		90%	2.5	1,872	4,104	8,643
וסו וו	<u> </u>	2,250		90%	1.0	1,872	2,404	5,063
	I EISC MAINT, SHOD	-,	†	60%	2.0	1,287	2,404	3,375
T 161 T 162 T 163	Elec Maint. Shop Officers Quarters Military	2.250						
T 162 T 163	Officers Quarters Military	2,250		90%	2.5	1,872	2,404	5,063
T 162 T 163 T 164	Officers Quarters Military Admin General Purpose	2,250		90% 90%	2.5 2.5	1,872 1,872		5,063 5,063
T 162 T 163 T 164 T 165	Officers Quarters Military Admin General Purpose Admin General Purpose	2,250 2,250		90%	2.5	1,872	2,404	5,063
T 162 T 163 T 164 T 165 T 166	Officers Quarters Military Admin General Purpose Admin General Purpose Officers Quarters Military	2,250 2,250 2,250		90% 60%	2.5 2.0	1,872 1,287	2,404 2,404	5,063 3,375
T 162 T 163 T 164 T 165 T 166 T 167	Officers Quarters Military Admin General Purpose Admin General Purpose Officers Quarters Military Officers Quarters Military	2,250 2,250 2,250 2,250		90% 60% 60%	2.5 2.0 2.0	1,872 1,287 1,287	2,404 2,404 2,404	5,063 3,375 3,375
T 162 T 163 T 164 T 165 T 166 T 167 S 168	Officers Quarters Military Admin General Purpose Admin General Purpose Officers Quarters Military Officers Quarters Military General Purp Warehouse	2,250 2,250 2,250 2,250 2,250 6,560		90% 60% 60% 90%	2.5 2.0 2.0 1.0	1,872 1,287	2,404 2,404	5,063 3,375 3,375 0
T 162 T 163 T 164 T 165 T 166 T 167	Officers Quarters Military Admin General Purpose Admin General Purpose Officers Quarters Military Officers Quarters Military	2,250 2,250 2,250 2,250		90% 60% 60%	2.5 2.0 2.0	1,872 1,287 1,287	2,404 2,404 2,404	5,063 3,375 3,375

TABLE B-9 BUILDING BASELINE LIGHTING ENERGY USE SUMMARY

Fac		Area	1 = BLDG	USAGE	Default	ON-HOUR	CONNECTE	Baseline	
No.	Installation Name	(SF)	USAGE	FACTOR		PER	LOAD	Energy	
110.	nistanation Name	(0.7	FACTORE	%	Watts/SF	YEAR	Watts	kWH/Yr	
S 182	Commissary	3,000	1 AOTONE	95%	3.0	1,664	12,672	25,040	
S 186	Sup Svc Admin Bldg	1,920		90%	2.5	1,872	5,328	11,221	
P 190	Post Chapel	2,720		20%	0.3	473	3,437	3,253	
S 197	Admin Bldg R&D - Office	2,100		90%	2.5	1,872	16,885	35,560	
3 197	Admin Bldg R&D - Electronics	6,062		90%	1.0	1,51	,	0	
\$ 198	General Inst Bidg	1,090		90%	2.5	1,664	2,116	3,961	
P 205	Admin General Purpose	35,820		90%	2.5	3,328	24,262	90,837	
	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
P 206	Enlisted Pers Dining Fac	16,768	•	60%	2.5	4,368	8,208	43,023	
200	Kitchen Area - Scullery	10,700		00%		1,,000	0,200	0	
P 207	Eni Barracks w/o Dining	35,820		60%	2.0	3,203	24,062	84,082	
	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
P 208	Enl Barracks w/o Dining	35,820		60%	2.0	3,203	24,262	84,781	
	Company HQ Building	5,161	1 1	90%	2.5	2,080	12,903	30,192	
P 209	AAFES Snack Bar	3,320	•	50%	2.5	1,092	4,158	7,568	
P 210	Hith/Dntl Clinic w/ Beds	10,973		95%	2.0	6,989	15,192	126,081	
	Outdoor Swimming Pool	10,570	C17	80%	2.5	5,555		0	
P 211 P 212	Gymnasium	8,907		80%	2.5	2,803	10,479	33,566	
P 219	Physical Fitness Center	3,212	1	80%	2.5	2,402	8,030	25,722	
P 229	Eni Barracks w/o Dining	40,915		60%	2.0	3,203	24,262	84,781	
P 229A	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
	Enl Barracks w/o Dining	35,820		60%	2.0	3,203	24,262	84,781	
	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
S 235	Admin General Purpose	3,000	· · · · · ·	90%	2.5	2,080	4,608	10,783	
S 236	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 237	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 238	Sig Photo Lab	14,548		90%	2.5	2,080	22,304	52,191	
P 240	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 241	GM Facility	10,000		90%	2.5	2,080	18,004	42,129	
S 243	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 244	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 246	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 247	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
P 252	Vehicle Maint Shop DS	12,299	1	90%	1.0	2,080	12,299	28,780	
P 256	Vehicle Maint Shop ORG	5,294		90%	1.0	2,080	5,294	12,388	
P 259	Vehicle Maint Shop ORG	13,667	1	90%	1.0	2,080	13,667	31,981	
S 283	FE Maintenance Shop	4,000		90%	1.0	2,080	3,894	9,112	
S 286	Admin General Purpose	3,000		90%	2.5	1,872	4,608	9,704	
P 287	Recreation Building	5,584		50%	2.5	983	9,526	15,604	
S 288	General Purpose Warehouse	3,000		90%	1.0	1,872	4,608	9,704	
	Electron Equip Facility	14,856		90%	1.0	1,872	18,648	39,273	
	Cont Humid Warehouse	7,400	1	90%	1.0	1,872	7,400	15,584	
	Enl Barracks w/o Dining	46,593		90%	2.0	4,659	22,500	117,936	
	ADP Building	10,800		90%	2.5	1,872	21,844	46,003	
	Detached Latrine/Shower	995		90%	1.0	1,213	720	983	
	Control Tower - Range SPT	891		90%	2.5	0	288	0	
Building							718,765	1,958,377	
Exterior/Street Lighting									
Exterior/Street Lighting Total Lighting 2,									

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

Fac		Area	Facility	Utiliz	ation Fa	actors		PROCESS E	NERGY U	SAGE
No.	installation Name	(SF)	Usage	PN	Days			Process	Cooking	Cooking & Other
140.	II istaliadon realis	(5.7	Code		/Week			kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr
Т6	Family Housing NCO & Enl	1,090	10	3	7	15		5,900	Included	10.5
	Family Housing NCO & Enl	1,397	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1.937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1.937	10	4	7	12	1	5,900	Included	10.5
	Family Housing NCO & Enl	1.937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1.937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12	Н	5,900	Included	10.5
P 46	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 47	Family Housing CG & WO	2,089	10	4	7	12		5,900	included	10.5
	Family Housing NCO & Eni	1,937	10	4	7	12		5,900	Included	10.5
	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 52A	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 52B	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P-53	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 54	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 55	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 56	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 57	Family Housing CG & WO	2,089	10	4	7	12	H	5,900	Included	10.5
P 58	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 59	Family Housing CG & WO	2,089	10	4	7	12	H	5,900	Included	10.5
P 60	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
S 79	Post Office, Main	1,000	8	2	6	0		1,700	0	<u>.</u>
P 80	Exchange, Main Retail	9,093	8	60	7	0	Н	112,084	0	
P 81	Theater with Dressing Rm's	6,719	6	350	3	100	П	1,058	0	···
P 101	Open Din Cons (Hacienda)	6,171	7	17	7	120	ı	0	39,420 5,475	•
	Club (Bar)	3046	9	9	7	10		6,092 4,000	5,475	
	Hacienda, East Rooms	4,721	3	10	7 7	9	Н	5,900	Included	10.5
	Hacienda, West Rooms	8,273	10	9	7	0		481	madded	10.5
P 116	Exchange Service Station	1,126	2.01	2 8	7			1,126	0	
	(Non-shop areas)	662	8	7	7			3,291		
T 120	Fire Station - Office	3,636	1 4	7	7	21		2.800	6,899	_
1	Fire Station - Dorm	2,653 4,949	2.02	1	Ó	0		134	-	
- 101	Fire Station - Garage		5	30	5	10		4,482	5,475	•
T 121	Bowling Center	4,952 628	2.01	30	5			13,144	-	•
100	See the Handle of C & M.I.	2,001	10	4		12		5,900	Included	10.5
T 124	Family Housing LC & MJ Officers Quarters Military	2,250	3	10	7	0		4,000		
T 127 P 128	Officers Quarters Military	20,196	4	80	7	160		32,000	52,560	
T 131	Family Housing CG & WO	998	10	4	7	12		5,900		
S 144	Gymnasium	7,172	5	No		0		6,491	0	
S 146	FE Facility	4,042	2.01	5		0		1,727	-	-
T 149	Family Housing NCO & Eni	1,196	10	4		12	i	5,900		10.5
T 156	FE Facility - Shop	1,753	2.01	3	5	0		749	-	•
1	FE Facility - Office	497	1	0	0			450		•
T 158	Vehicle Storage	1,859	2.02	0	0	0		50		•
T 161	Admin General Purpose	2,250	1	12	5	0		2,036	•	•
T 162	Elec Maint. Shop	2,250	2.01	11	5	0		961	•	•
H1 10Z										

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

E Soo	T	Area	Facility	Utiliz	ation F	actors	I	PROCESS E	NERGY U	SAGE
Fac	Installation Name	(SF)	Usage		Days					Cooking & Other
No.	installation Name	(31)	Code		/Week			i	_	Prop Mil BTU/Yr
T 164	Admin Consul Burness	2,250	1	NA	5	NA NA	ı	2.036	-	-
T 164	Admin General Purpose	2,250	1	NA	5	NA	1	2,036		•
T 165	Admin General Purpose	2,250	3	NA	5	NA.		NA.		-
T 166	Officers Quarters Military	2,250	3	NA	5	NA	ı	NA		
T 167	Officers Quarters Military	6,560	2.02		t in Use		ı	178		·
S 168	General Purp Warehouse	800	2.02	140	7	0	ı	22		-
T 172	Cold Storage Warehouse	3,599	2.02	4	5	0	ı	3,257		
P 177	Technical Library	3,599	11.3	43	5	31	1	272	10,184	-
P 178	Child Development Cntr	3,000	8.1	25	5	0		172,782	0	
S 182	Commissary		1	3	5	0		1,738		
S 186	Sup Svc Admin Bidg	1,920	6	10	7	3		1,058	1,643	
P 190	Post Chapel	2,720			5	0	ı	1,901	1,0-0	
S 197	Admin Bidg R&D - Office	2,100	1	5	5	0	1	2,589	•	•
	Admin Bidg R&D - Electronics	6,062	2.01	5			ł	2,589 986	<u> </u>	•
S 198	General inst Bidg	1,090		2	4	0	1	32.417	•	•
P 205	Admin General Purpose	35,820	1	90	5	•			•	-
	Company HQ Building	5,161	1	10	5			4,671	104.046	-
P 206	Enlisted Pers Dining Fac	16,768	7	563	7	563		0	184,946	-
	Kitchen Area - Scullery		7	563	7	563		0 000	-	-
P 207	Eni Barracks w/o Dining	35,820	3	80	7	0		32,000	•	•
	Company HQ Building	5,161	1	10	5	0		4,671	-	-
	Eni Barracks w/o Dining	35,820	3	90	7	0		36,000	-	-
	Company HQ Building	5,161	1	10	5	0		4,671		•
	AAFES Snack Bar	3,320	9	180	7	180		6,640	98,550	-
P 210	Hith/Dnti Clinic w/ Beds	10,973	12.1	35	7	9		37,308	2,957	•
P 211	Outdoor Swimming Pool	· _	5	NA	7 D/W		1	0	0	•
	Gymnasium	8,907	5	9	7	0	1	8,061	0	-
P 219	Physical Fitness Center	3,212	5.1	20	7	0	ı	2,907	•	-
P 229	Eni Barracks w/o Dining	40,915	3	28	7	0		11,200	-	-
	Company HQ Building	5,161	1	10	5	0		4,671	-	-
P 230	Eni Barracks w/o Dining	35,820	3	80	7	0		32,000	•	•
	Company HQ Building	5,161	1	10	5	0		4,671		-
S 235	Admin General Purpose	3,000	1	NA	5	0		2,715	-	•
4	Admin General Purpose	3,000	1	NA	5	0		2,715	•	•
S 237	Admin General Purpose	3,000	1	NA	5	0		2,715	-	
S 238	Sig Photo Lab	14,548	1	50	5	٥		13,166	-	-
<u></u>	Process				 	<u> </u>		16,425		
P 240	Admin General Purpose	3,000	1	12	5	0		2,715	0	-
S 241	GM Facility	10,000	1	15	5	0		9,050	0	•
			[]							•
										-
S 243	Admin General Purpose	3,000	1	12	5	0		2,715	0	-
S 244	Admin General Purpose	3,000	1	12	5	0	1	2,715	0	•
S 246	Admin General Purpose	3,000	1	12	5			2,715	0	•
S 247	Admin General Purpose	3,000	1	12	5	0		2,715	0	•
P 252	Vehicle Maint Shop DS	12,299	2.01	12	5	0		5,254	0	•
P 256	Vehicle Maint Shop ORG	5,294	2.01	4	5	0		2,261	0	- :
P 259	Vehicle Maint Shop ORG	13,667	2.01	12	5	0		5,838	0	-
S 283	FE Maintenance Shop	4,000	2.01	1	5	0		1,709	0	-
										•
S 286	Admin General Purpose	3,000	1	NA	5	0	4	2,715	0	-
P 287	Recreation Building	5,584	9	15	7	·		11,168	0	•
S 288	General Purpose Warehouse	3,000	2.02	NA	5	0		81	0	-

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

Fac	Area Facility Utilization F					actors
No.	Installation Name	(SF)	Usage	PN	Days	Meals
,,,,,		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Code		/Week	/Day
S 290	Electron Equip Facility	14,856	2.01	15	5	0
S 291	Cont Humid Warehouse	7,400	2.01	6	5	0
P 295	Eni Barracks w/o Dining	46,593	3	114	7	0
P 301	ADP Building	10,800	1	20	7	0
P 642	Detached Latrine/Shower	995	3.1	25	7	0
S 2201	Control Tower - Range SPT	891	1	1	Few	0
Totals						

PROCESS ENERGY USAGE							
Process	Cooking	Cooking & Other					
kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr					
6,346	0	•					
		•					
3,161	0						
45,600	0	•					
9,774	0	-					
495,272		•					
		•					
0	0	-					
806	0	•					
1,431,044	408,107	304.5					

TABLE B-11 ESTIMATED ENERGY USE VERSUS RECORDED ENERGY USE

Description	Amount	Units
FY91 Heating Fuel Oil Deliveries	24,648	Mil BTU/Yr
Baseline Simulated Fuel Oil Use	21,797	Mil BTU/Yr
Difference for Heating Fuel Oil	-11.6%	
FY91 Adjusted Propane Deliveries	20,963	Mil BTU/Yr
Baseline Simulated Propane Use	18,337	Mil BTU/Yr
Difference for Propane (See Note)	-12.5%	
FY91 Electricity Usage		
Main Garrison Account	10,738,601	kWH/Yr
Water Pump Account	136,240	kWH/Yr
T376 Account	11,815	kWH/Yr
T6 Account	11,731	kWH/Yr
Total FY91 Electricity Use	10,898,387	kWH/Yr
Baseline Simulated Electricity Use	9,893,823	kWH/Yr
Difference for Electricity	-9.2%	
•		

Note: Propane delivery records were only made available for the period between 6 November 1991 and 31 August 1992. These delivery records were normalized to a full year using the ratio of 65 Degree F based Heating Degree Hours in the period of record.

TABLE B-12
LIGHTING ENERGY USE CALCULATION METHODOLOGY

Function	Description of Usage	Usage	Lighting
0	Description of osage	Factor	Watts/SF
Code			
1	Offices	90%	2.5
2	Shops and Warehouses	90%	1.0
2.1	Commercial Laundries	90%	2.0
3	Barracks & Quarters w/o Dining	60%	2.0
3.1	Detached Latrine with Bathing	90%	1.0
4	Barracks & Quarters with Dining	60%	2.0
5	Recreation & Gyms w/o Bathing	80%	2.5
5.1	Recreation & Gyms with Bathing	80%	2.5
6	Theaters / Community Facilities	20%	2.5
7	Dining Facilities, all uses	60%	2.5
8	Base Exchanges & Stores	95%	2.5
8.1	Commissaries	95%	3.0
9	Clubs, Officers, NCO, Enl PN	50%	2.5
10	Family Housing	25%	1.5
11.1	Schools w/o Bathing	85%	3.0
11.2	Schools with Bathing	85%	3.0
11.3	Child Development Centers	85%	2.0
12	Medical Facilities, Clinics	95%	2.0
12.1	Medical Facilities, Hospitals	95%	2.0
13	Multiple Usage Buildings	95%	2.0

LIGHTING ENERGY USE CALCULATIONS

Lighting energy use for EEAP buildings at Fort Hunter Liggett is determined based on a combination of field observations, design data and experience in similar projects. Baseline lighting energy use is calculated as follows:

Buildings with complete lighting system take-offs tabulated:

The building schedule is evaluated to determine schedule on-time hours per year. The watts per fixture (listed separately by fixture type) are multiplied by the sheduled on-hours per year and a utilization (diversity) factor. Electrical energy use is recorded in kWH/Yr. The building connected lighting load is determined by summing the connected loads of all tabulated fixtures.

Buildings with only candidate retrofit lighting fistures tabulated:

Several building lighting system tabulations are limited to listing only those fixtures which are candidates for retrofit. For these buildings, lighting energy usage and connected loads are determined based on lighting densities and utilization factors normally associated with the building's function.

TABLE B-13 PROCESS ELECTRIC ENERGY USE SUMMARY

PROCESS ENERGY USE FACTORS

Usage	Description	Process Elect	ric Use	Cooking	Propane
Code	•	kWH/Unit-Yr	Unit	kWH/Meal	Mil BTU/Yr
1	Offices & Administratio	0.91	SF	-	•
2.01	Shops & Warehouses:	0.43	SF	•	•
2.02	Shops & Warehouses:	0.03	SF	-	
2.10	Laundry - Commercial	Separate Ca	ics.		•
3	Barracks & Quarters w/	400	PN	-	1 -
3.1	Detached Latrine Buildi	0	NA	-	-
4	Barracks & Quarters wi	400	PN	0.90	-
5	Recreation Facilities	0.91	SF	1.50	•
5.1	Gymnasiums	0.91	SF	-	•
6	Theaters & Assembly F	1,058	Facility	1.50	-
7	Dining Facilities: All El	included with	meals	0.90	•
8	Base Exchanges & Sto	1.70	SF	1.50	•
8.1	Commissaries	3.50	SF	1.50	-
9	Clubs: Officers & NCO	2.00	SF	1.50	-
10	Family Housing, Includ	5,900	Facility,	Included	10.5 Mil BTU/Yr
11	Schools	2.30	SF	0.90	•
11.3	Child Development Ce	272	Facility	0.90	•
12	Medical Facilities, Clini	-	•	0.90	•
12.1	Clinics with Beds	3.40	SF	0.90	-

PROCESS ENERGY USAGE FACTORS

Usage Code 1: Offices & Administration

Equipment typically includes: Typewiters, coffee pots, vending machines, some copy machines, microwaves, personal computers and prionters.

Based on equipment loads and diversity of use, a small office (about 5,000 SF or less) without a copy machine or personal computers will consume about 500 kW-Hr/Yr of electric power.

Additional power use for personal computers is esimated at about 150 kW-Hr/Yr per unit [Newsham, G.R., et all, "A Case Study of the Energy Consumption of Desktop Computers", IEEE Publication Number 0- 7803- 0634- 1/92\$03.00.] Almost all offices are equipped with personal computers. Each office uses about 200 SF of office-building floor area.

Additional power consumption by microwave ovens is estimated at 275 kW-Hr/Yr assuming an average 750 Watt oven, used a total of 1.5 Hr/Day, 5 Days/Week.

A larger office, equipped with a copy machine is estimated to consume an additional 1,000 kW-Hr/Yr.

Thus, for offices 5,000 SF or smaller, electric use is estimated at:

500	kW-Hr/Yr, plus
150	kW-Hr/Yr per 200 SF @ PC's, and
275	kW-Hr/Yr per 5,000 SF @ microwave ovens
0.91	kW-Hr/Yr-Office SF

DOMESTIC HOT WATER TANK & PIPING HEAT LOSS CALCULATIONS

Piping losses for non circulated and circulated systems are determined in the following calculations:

Losses from Non-Circulated Domestic Hot Water Systems

Losses are experienced only as a result of hot water use. Water initially in the pipes is wasted waiting for hot water to arrive, and hot water in the pipes after the use is completed cools. Thus, each time hot water is used, twice the energy needed to heat the volume of water in piping is lost. Heat loss calculations are based on a number of assumed uses per day (dependant on building type), the volume of water contained in piping systems and the temperature of the water.

Family Housing Buildings:

Average 3/4" pipe, 40 foot run =

0.29 Gallons

Average 4 uses per day per person, thus:

4 PN x 4 uses x .29 Gallons x 2 =

3,413 Gallons/Year

Lost Domestic Hot Water Heat

Stores and Other Community Facilities

Toilets in public access buildings are used by employees and customers. Employees are assumed to have 3 uses per day each and customers are assumed to have one use per 5 customers.

Average 3/4" pipe, 20 foot run =

0.15 Gallons

Average use for employees:

1 PN x 3 uses x .15 Gallons x 2 =

320 Gallons/Employee-Year

Lost Domestic Hot Water Heat

Average Use for Customers:

1 PN x 1/5 uses x .15 Gallons x 2 =

21.3 Gallons/Customer-Year

Lost Domestic Hot Water Heat

Building 6:

Insulation Repairs needed; add to load calculated for Family Housing:

15 LF Pipe

0.75 inch Dia, Bare Pipe

590.00 BTUH/10LF

7.75 Mil BTU/Yr Added Load

Building 80:

Insulation Repairs needed; add to load calculated for normal use for stores:

15 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

590.00 BTUH/10LF

7.75 Mil BTU/Yr Added Load

Building 101

Dining Area Water Heater: ~75 LF 1 inch pipe; 50 uses per day

3.06 Gallons

160 Deg F

2,683 BTU Lost per Use

33.5 Mil BTU/Yr Load Lost

Added losses will result from A/C System type insulation on about 75 LF of 1 inch dia piping. Recommend it be replaced with proper insulation for exterior hot water piping.

Bar Area Water Heater Piping: ~20 LF 3/4 inch pipe; 20 uses per day

0.46 Gallons

140 Deg F

326 BTU Lost per Use

1.6 Mil BTU/Yr Load Lost

Rooms - East Area Water Heater Piping: ~50 LF 1 inch pipe; 3 uses per day per PN.

2.04 Gallons

140 Deg F

1,448 BTU Lost per Use

1.6 Mil BTU/Yr Load Lost

Rooms - West Area Water Heater Piping: ~112 LF 1 inch pipe; 3 uses per day per PN.

4.57 Galions

120 Deg F

2,480 BTU Lost per Use

2.7 Mil BTU/Yr Load Lost

35 LF of 3/4 inch Bare pipe should be insulated: losses are based on uses for 3 hours per day

35 LF,

140 Deg F,

100 BTUH/10L

0.38 Mil BTU/Y

Building 120:

Insulation Repairs needed; add to load calculated for normal use for stores:

15 LF Pipe

0.75 inch Dia, Bare Pipe

25 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

310.00 BTUH/10LF

4.07 Mil BTU/Yr Added Load

60.00 BTUH/10LF

1.31 Mil BTU/Yr Added Load

Total @

110 Deg F HW Temperature:

5.39 Mil BTU/Yr Added Load

15 LF Pipe

0.75 inch Dia, Bare Pipe

25 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

550.00 BTUH/10LF

7.23 Mil BTU/Yr Added Load

120.00 BTUH/10LF

2.63 Mil BTU/Yr Added Load

Total @

140 Deg F HW Temperature:

9.86 Mil BTU/Yr Added Load

Building 121:

Kitchen Area: 50

uses per day,

20 LF

1 inch pipe

0.82 Gallons

121 Deg F

450 BTU Lost per Use

8.2 Mil BTU/Yr Load Lost

Building 124:

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

480.00 BTUH/10LF

4.20 Mil BTU/Yr Added Load

Building 127:

Water Heater Piping: ~50 LF 1 inch pipe; 3 uses per day per PN.

2.04 Gallons

128 Deg F

1,244 BTU Lost per Use

1.4 Mil BTU/Yr Load Lost/PN

Note: Building 127 DHW pipe insulation repairs are needed for 50 LF of 1-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 128 Deg F, 1-inch Pipe

550 BTUH/10LF Bare

90 BTUH/10L 24.09 Mil BTU/Y

Total Heat Losses

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

510.00 BTUH/10LF

4.47 Mil BTU/Yr Added Load

Building 149:

Building 131:

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

510.00 BTUH/10LF

4.47 Mil BTU/Yr Added Load

Building 156: 0.5 inch Dia 10 LF Pipe 3 Uses per day/PN, 0.02 Mil BTU/Yr Added Load 0.04 Gallons Building 190: 0.5 inch Dia 20 LF Pipe 1 Uses per day/PN, 0.17 Mil BTU/Yr Added Load 0.08 Gallons Building 197: inch Dia 30 LF Pipe 3 Uses per day/PN, 0.72 Mil BTU/Yr Added Load 0.49 Gallons Buildings 205A, 207A, 208A, 229A and 230A: inch Dia 0.75 15 LF Pipe 3 Uses per day/PN, inch Dia 0.5 10 LF Pipe Gallons 0.18 PN Temp Bldg 0.30 Mil BTU/Yr Added Load 205A 10 135 0.28 Mil BTU/Yr Added Load 207A 10 130 0.32 Mii BTU/Yr Added Load 140 208A 10 0.24 Mil BTU/Yr Added Load 120 10 229A 0.28 Mil BTU/Yr Added Load 130 10 230A Building 209: inch Dia 60 LF Pipe 0.2 Uses per PN-Day 19.39 Mil BTU/Yr Added Load 0.98 Gallons **Building 212:** 20 LF Pipe 0.75 inch Dia 1 Uses per PN-Day 0.36 Mil BTU/Yr Added Load 0.18 Gallons Insulation Repairs needed:

0.75 inch Dia, Bare Pipe

3.29 Mil BTU/Yr Added Load

3.66 Mil BTU/Yr Added Load

8 LF Pipe

470.00 BTUH/10LF

Total Present Load Losses:

Σ

Building 219:

1 Uses per PN-Day

50 LF Pipe

1 inch Dia

0.82 Gallons

3.24 Mil BTU/Yr Added Load

Insulation Repairs needed:

10 LF Pipe

2 inch Dia, Bare Pipe

800.00 BTUH/10LF

7.01 Mil BTU/Yr Added Load

Total Present Load Losses:

10.25 Mil BTU/Yr Added Load

Building 241:

3 Uses per PN-Day

20 LF Pipe

0.5 inch Dia

0.08 Gallons

0.73 Mil BTU/Yr Added Load

Insulation Repairs needed:

20 LF Pipe

0.5 inch Dia, Bare Pipe

310.00 BTUH/10LF

5.43 Mil BTU/Yr Added Load

Total Present Load Losses:

6.16 Mil BTU/Yr Added Load

Building 252:

3 Uses per PN-Day

20 LF Pipe

0.75 inch Dia

0.18 Gallons

1.31 Mil BTU/Yr Added Load

Building 256:

3 Uses per PN-Day

10 LF Pipe

0.5 inch Dia

0.04 Gallons

0.12 Mil BTU/Yr Added Load

Building 259:

3 Uses per PN-Day

20 LF Pipe

0.75 inch Dia

0.18 Gallons

1.41 Mil BTU/Yr Added Load

Building 287:

3 Uses per PN-Day

88 LF Pipe

0.75 inch Dia

3 Uses per PN-Day

20 LF Pipe

0.5 inch Dia

0.81 Gallons 0.08 Gallons 9.44 Mil BTU/Yr Added Load 0.95 Mil BTU/Yr Added Load

Insulation Repairs needed:

10 LF Pipe

0.75 inch Dia, Bare Pipe

550.00 BTUH/10LF

4.82 Mil BTU/Yr Added Load

Total Present Load Losses:

15.21 Mil BTU/Yr Added Load

Building 301:

3 Uses per PN-Day

15 LF Pipe

0.5 inch Dia

0.06 Gallons

0.86 Mil BTU/Yr Added Load

Losses from Circulating Domestic Hot Water Systems

Heat loss calculations are based on takeoffs from building plans, field inspections of piping condition and DHW temperature. Heat losses are determined from Figure 8-47, Architects and Engineers Guide to Energy Conservation in Existing Buildings, February 1980, U.S. DOE.

Building 120

	Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
Ì	1/2	90	1	140	87	6.9
1	3/4	90	1	140	88	6.9

Building 128

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LĚ	Insul IN	Temp	BTUH/10	Mil BTU/Y
3	20	1	140	363	6.4
2	90	1	140	175	13.8
1-1/2	118	1	140	138	14.2
1	88	1	140	100	7.7
3/4	270	1	120	75	17.7

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 178

	Pipe Dia	Length LF	Effective Insul IN		Heat Loss BTUH/10	
t	3/4	200	1	110	48	8.3
١	1/2	200	1 1	90	45	7.9

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (110 - 80) / (110 - 68) =

0.71

Buildings 205, 207 & 208

Ī	Pipe	Length	Effective	DHW	Heat Loss	Total Loss
١	Dia	LF	Insui IN	Temp	BTUH/10	Mil BTU/Y
Ì	1	180	1	140	100	15.8
١	3/4	180	1	140	75	11.8
l	1/2	90	1	140	87	6.9
1	3/4	150	1	120	75	9.9
į	1/2	150	1	120	50	6.6

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Note: Buildings 207 and 208 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch return piping.

Additional heat losses from these pipes are:

Supply @ 140 Deg F, 2-inch Pipe Return @ 120 Deg F, 3/4-inch Pipe 1,110 BTUH/10LF Bare 390 BTUH/10LF Bare 180 BTUH/10LF 1-inch In 75 BTUH/10LF 1-inch In

Total Heat Losses

1,500 BTUH/10LF Bare

13.14 Mil BTU/Yr Added Lo

Building 229

ſ	Pipe	Length	Effective	DHW	Heat Loss	
١	Dia	LF	insui IN	Temp	BTUH/10	Mil BTU/Y
Ì	1	180	1	130	90	14.2
1	3/4	180	1	130	80	12.6
1	1/2	90	1	130	60	4.7
-	3/4	150	1	110	48	6.3
١	1/2	150	1	110	47	6.2

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (130 - 80) / (130 - 68) =

0.81

Note: Building 229 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch return piping.

Additional heat losses from these pipes are:

Supply @ 130 Deg F, 2-inch Pipe Return @ 110 Deg F, 3/4-inch Pipe Total Heat Losses 940 BTUH/10LF Bare 320 BTUH/10LF Bare 1,260 BTUH/10LF Bare 170 BTUH/10LF 1-inch In 48 BTUH/10LF 1-inch In 11.04 Mil BTU/Yr Added Lo

Building 230

	Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
\vdash	1	180	1	129	89	14.0
	3/4	180	1	129	79	12.5
ŀ	1/2	90	1	129	59	4.7
	3/4	150	1	109	47	6.2
	1/2	150	1	109	46	6.0

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (129 - 80) / (129 - 68) =

0.80

Note: Building 230 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch return piping.

Additional heat losses from these pipes are:

Supply @ 129 Deg F, 2-inch Pipe Return @ 109 Deg F, 3/4-inch Pipe 939 BTUH/10LF Bare 319 BTUH/10LF Bare 1,258 BTUH/10LF Bare 169 BTUH/10LF 1-inch In 47 BTUH/10LF 1-inch In 11.02 Mil BTU/Yr Added Lo

Total Heat Losses

Building 206

Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
2	300	1	140	175	46.0
1-1/2	25	1	140	138	3.0
1 1 1	30	1	140	100	2.6
3/4	170	1	140	88	13.1
2	250	1	120	110	24.1

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 210

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LF	Insul IN	Temp	BTUH/10	Mil BTU/Y
2	10	1	140	175	1.5
1-1/2	66	1	140	138	8.0
1-1/4	45	1	140	115	4.5
1 1	69	1	140	100	6. 0
3/4	204	1	140	88	15.7
1/2	195	1	120	87	14.9
1/2	273	1	120	50	12.0

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 238

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LF	Insul IN	Temp	BTUH/10	Mil BTU/Y
1-1/2	30	1° HTHW	160	185	4.9
1-1/4	40	1º HTHW	160	150	5.3
1	34	1º HTHW	160	122	3.6
3/4	57	1º HTHW	160	110	5.5
1	20	1º HTW	122	74	1.3
3/4	174	1º HTW	122	76	11.6
3/4	70	1º HWR	102	35	2.1
1/2	54	1" HWR	102	30	1.4

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Load Mil BTU/Yr

Factor: (160 - 80) / (160 - 68) = 0.87 Factor: (122 - 80) / (122 - 68) = 0.78 Factor: (102 - 80) / (102 - 68) = 0.65

Note: Building 238 DHW pipe insulation repairs are needed for 10 LF of 1-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 122 Deg F, 1-inch Pipe

Total Heat Losses

800 BTUH/10LF Bare

74 BTUH/10LF 1-inch In 7.01 Mil BTU/Yr Added Lo

Building 290

Pipe Dia	Length LF	Effective Insul IN		Heat Loss BTUH/10	
3/4	60	1	135	84	4.4
3/4	60	1	115	62	3.2

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (135 - 80) / (135 - 68) =

0.82

Note: Building 290 DHW pipe insulation repairs are needed for 15 LF of 3/4-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 135 Deg F, 3/4-inch Pipe

600 BTUH/10LF Bare

84 BTUH/10LF 1-inch In

Total Heat Losses

7.88 Mil BTU/Yr Added Lo

Building 295

Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
2	270	1	128	168	39.7
1-1/2	300	1	128	116	30.5
1-1/4	330	1	128	97	28.0
1	45	1	128	88	3.5
3/4	320	1	108	48	13.5

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Load Mil BTU/Yr

Factor: (128 - 80) / (128 - 68) =

0.80

Factor: (108 - 80) / (108 - 68) =

0.70

Note: Building 295 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 128 Deg F, 2-inch Pipe

915 BTUH/10LF Bare

165 BTUH/10LF 1-inch In 8.02 Mil BTU/Yr Added Lo

Total Heat Losses

Building 642

	Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	
t	1-1/2	94	1	130	120	9.9
١	1-1/2	94	1	110	70	5.8

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 2: Shops & Warehouses

Shops typically have one small office of about 300 to 500 SF area. It is assumed that each is fitted with a 300 SF office. Energy use from the office is, thus:

272 kW-Hr/Yr for offices

Typical (10,000 SF) shop-type equipment consumes about 4,000 kW-Hr/Yr.

Process energy use for shops is, thus

0.43 kW-Hr/SF-Yr

Warehouses do not consume significant process energy, but are equipped with small offices similar to shops. Process energy use in warehouses is, thus:

Process energy use for warehouses i

0.03 kW-Hr/SF-Yr

Usage Code 3: Barracks & Quarters without Dining

A typical 50-PN barracks without dining consumes about 20,000 kW-Hr/Yr of process energy. Loads satisfied include vending machines, watr coolers, stereos, refrigerators, washing machines and dryers, televisions and various small appliances.

Annual process energy

400 kW-Hr/PN-Yr

Usage Code 4: Barracks & Quarters with Dining

Energy use is the same as for Usage Code 3, except that cooking process energy must be added. See Usage Code 7 Dining Facilities, for the cooking energy component of process energy usage.

Usage Code 5: Recreation Facilities & Gyms without Bathing

Typically, these facilities are equipped with a small office, and minimal other process type electrical equipment. (No saunas are in operation at Fort Hunter-Liggett.)

Annual process energy

0.91 kW-Hr/SF-Yr

Usage Code 5.1: Recreation Facilities & Gyms with Bathing

Process energy use is the same as for Usage Code 5. Domestic hot water (DHW) bathing-energy use is addressed in baseline DHW use calculations.

Usage Code 6: Theaters & Community Facilities

The single theater at Fort Hunter Liggett operates 3 days per week for a period of about 6 hours. Projector equipment load is estimated at 1 kW. A small office of about 300 SF will consume energy proportional (3 Days to % Days) to a small office as described above.

Annual process energy

1,058 kW-Hr/Yr, including projection equipment

Annual process energy

244 kW-Hr/Yr

(two x 300 SF Office equivalent)

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 7: Dining Facilities

Consolidated Dining Facilities (mess halls): Value is based on results of metering several large Dining Facilities of a similar size. The value shown below includes all process energy consumption, including cooking.

Annual process energy

0.90 kW-Hr/Meal, all electric cooking

Usage Code 8: Base Exchanges & Stores

Base exchanges and retail type stores consume electric power for administrative office areas, at check-out stands, for water coolers, vending machines and for product refrigeration. Some facilities also have snack bars.

Annual process energy

1.70 kW-Hr/SF-Yr

Annual Cooking proce

1.50 kW-Hr/Meal, all electric cooking

Usage Code 8.1: Commissaries:

Commissaries consume electric power for administrative office areas, at check-out stands, for water coolers, vending machines and for product refrigeration. Some facilities also have snack bars.

Annual process energy

3.50 kW-Hr/SF-Yr

Annual Cooking proce

1.50 kW-Hr/Meal, all electric cooking

Usage Code 9: Clubs, Officers & NCO, etc.

Cooking Energy Use: Value is based on results of metering several clubs and snack bars of a similar size and configuration. The value shown below includes all process energy consumption, including cooking.

Cooking process ener

1.50 kW-Hr/Meal, all electric cooking

Non-cooking Energy Use: Clubs contain small offices, vending machines, coolers and video games. Values are based on take-offs from several officers and NCO clubs similar to those at Fort Hunter Liggett.

Non-cooking process

2.00 kW-Hr/SF-Yr

Usage Code 10: Family Housing

Process energy use for family housing units is based on metering numerous units and take-offs of equipment and furnishings. The annual value provided includes cooking energy consumption for propane burning stoves and ovens in kitchens.

Family Housing Unit pr

5,900 kW-Hr/Yr Electric Power 10.5 Mil BTU/Yr Propane Use

Usage Code 11: Schools

There are no schools identified in this EEAP.

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 11.3: Child Development Centers

Process energy consumption for Child Development Centers includes administrative office equipment, including copying machines, cooking snacks and meals for the children. For the purposes of estimating process energy use, one 300 SF size office is assumed, including copy machine. Meals are prepared using an all-electric kitchen at about the same efficiency as recorded for Usage Code 9 above.

Non-cooking process

272 kW-Hr/Yr

Cooking process ener

0.90 kW-Hr/Meal, all electric cooking

Usage Code 12: Clinics (w/o Beds)

There are no Clinics without beds in this EEAP.

Usage Code 12.1: Hospitals & Clinics with Beds

Non-cooking process

3.40 kW-Hr/SF-Yr

Cooking process ener

0.90 kW-Hr/Meal, all electric cooking

Special, Significant Process Loads

Building 80 Post Exchange:

Refrigeration Equipment:

24.2 kW approx connected load

4,000 approx full Load Hours

96,626 kWH/Yr

Building 121 Bowling Center:

Pin Setting Equipment load is about:

2.6 kWH/Yr-SF

Energy use based on detailed studies of similar Army facilities.

Building 182 Commissary:

Refrigeration Equipment:

40.6 kW approx connected load

4,000 approx full Load Hours

162,282 kWH/Yr

Building 238 TEXCOM HQ Building / Photo Lab:

46.2 kW Panel Load Fata

0.57 Diversity Factor @ Panel Rating

0.30 Usage Diversity Assumed

2,080 Hours per Year

16,425 kWH/Yr

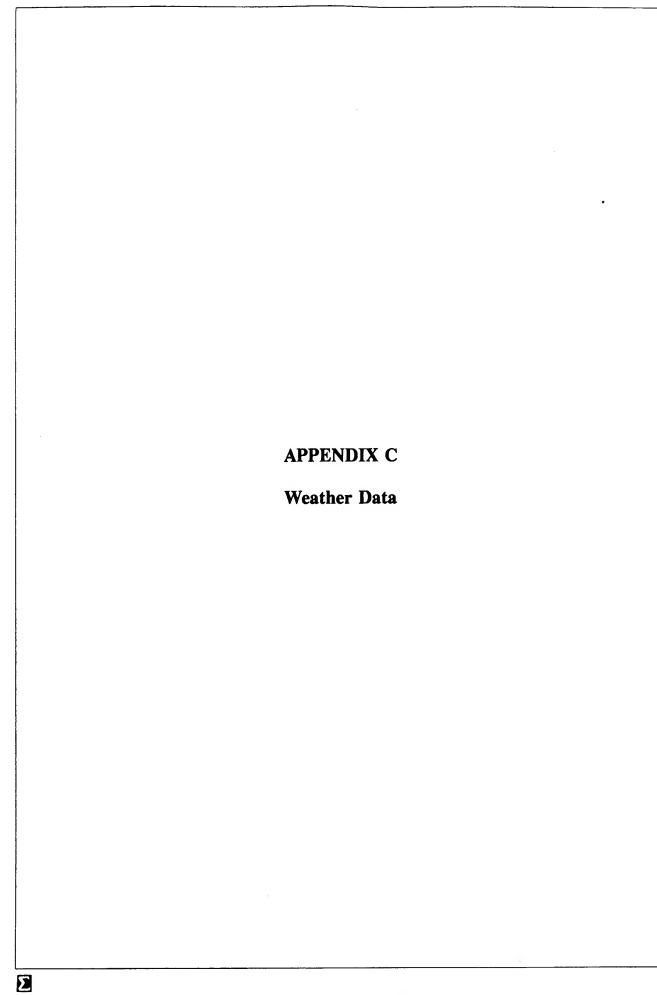
Building 301 ADP Building:

188.5 kW Connected Load @ Equipment List

0.30 Usage Diversity Assumed

8,760 Hours per Year

495,272 kWH/Yr



EEAP, Limited Energy Study Fort Hunter-Liggett, California

APPENDIX C

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APPENDIX C

WEATHER DATA

Weather data is required for building heating, ventilating and air conditioning (HVAC) analyses and designs. The Army's Engineering Weather Data Technical Manual (TM 5-785) lists heating and cooling system design data for Fort Hunter-Liggett, California (FHL). Design data extracted from this TM appears as Table C-1.

C.1 Development of Hourly Temperature Data for Fort Hunter-Liggett.

Bin type temperature data, provided in TM 5-785 for many locations, is not available for FHL. This type of data is required to accurately model building HVAC system energy consumption for existing conditions and for energy savings modifications to be evaluated.

Available meteorological data is evaluated and adjusted to synthesize a useable data base for FHL. Data sources used in this development include:

- (1) TM 5-785 U.S. Army Engineering Weather Data Technical Manual: Design heating and cooling data and annual Heating Degree-Days (H-DD/Yr) for FHL and for Camp Roberts (near Paso Robles) are used. Refer to Table C-1.
- (2) Trane Corporation weather data for Paso Robles California: Temperature data is available for use with the Trane Trace HVAC computer simulation program. This data is provided in the form of hourly dry and wet bulb temperatures for a typical day of each month. Paso Robles data, the closest location for which reliable hourly weather data is available, is used as the basis for the synthesis of a day's hourly data for FHL.
- (3) Historical average daily minimum and maximum temperatures for FHL: This data is provided by the TECOM Atmospheric Sciences Division, Hunter-Liggett Meteorological Team. This data is based on almost 30 years of records beginning in 1964 and continuing through the present.

The purpose of this project is to reduce energy use. Accurate calculation of energy use by building HVAC systems requires site-specific meteorological data. Adjustments are made to Paso Robles hourly temperature data to synthesize a record for FHL. Temperatures are adjusted until calculated H-DD/Yr based on average daily temperatures match the H-DD/Yr listed in TM 5-785 for FHL. The procedure used for this synthesis is summarized below:

(1) Calculated 65 degree F based H-DD/Yr using hourly temperature data for Paso Robles: 3,540 H-DD/Yr @ hourly temperatures, 1 day per month.

EEAP, Limited Energy Study Fort Hunter-Liggett, California

- (2) Calculated 65 degree F based H-DD/Yr using average daily temperatures for Paso Robles: 2,898 H-DD/Yr @ average daily temperatures, 1 day per month.
- (3) Compared calculated H-DD/Yr for Paso Robles results to H-DD's listed in TM 5-785 for Camp Roberts (very close to Paso Robles) and found that H-DD's calculated from average daily temperatures match those listed in TM 5-785 for Camp Roberts: Camp Roberts has 2,890 H-DD/Yr @ TM 5-785.
- (4) Adjusted Paso Robles hourly temperatures at and below 65 degrees until H-DD/Yr calculated based on average daily temperatures matches the H-DD's listed in TM 5-785 for FHL:

FHL 3,332 H-DD/Yr @ TM 5-785

FHL 3,289 H-DD/Yr @ average daily temperatures (-1.3% of TM value)

FHL 4,026 H-DD/Yr @ hourly temperatures, 1 day per month.

- (5) Compared data sources available to synthesized hourly temperatures for each month by plotting results. Refer to Figures C-1 through C-8.
- (6) Adjusted Paso Robles wet bulb temperatures for the synthesized FHL data to match the profile shown for Paso Robles. Results are plotted on Figures C-2 through C-8.

The comparison of synthesized weather data to records at FHL and Paso Robles shown on Figure C-1 indicates that synthesized temperature data are reasonable.

Note that cooling season temperatures (above about 70 degrees F) are not adjusted from the Paso Robles data. No measure of cooling degree days (or hours) is available for FHL from TM 5-785 upon which to base an adjustment calculation. Based on inspection of summer (cooling) season design and criteria temperatures shown on Table C-1, cooling requirements are about equivalent for Camp Roberts and FHL.

C.2 Daily Degree-Hour Schedules.

Hourly schedules are developed for use in analyses of energy savings calculations for both heating and cooling seasons. Hourly schedules will allow energy use calculations to be tailored to an individual buildings specific operating schedule.

The schedules are shown on Tables C-2 through C-5 for heating and for cooling degree-hours. Calculations use degree-hours rather than degree-days.

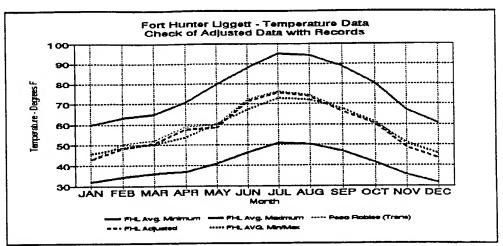


Figure C-1. Check of Synthesized Weather Data Against Records.

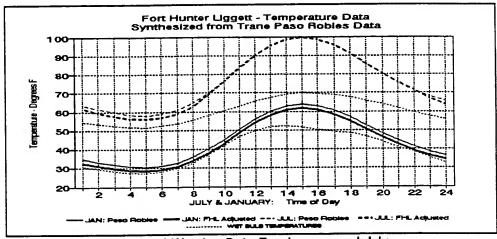


Figure C-2. Synthesized Weather Data For January and July.

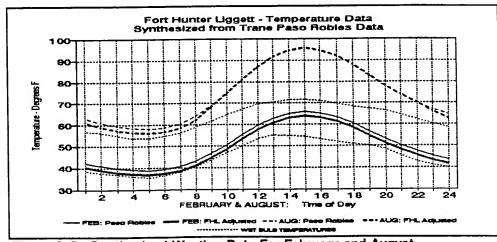


Figure C-3. Synthesized Weather Data For February and August.

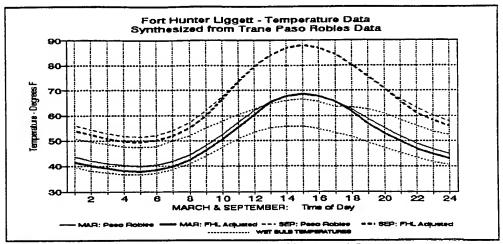


Figure C-4. Synthesized Weather Data For March and September.

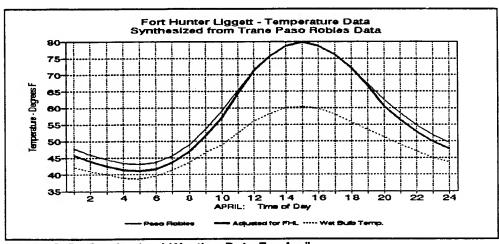


Figure C-5. Synthesized Weather Data For April.

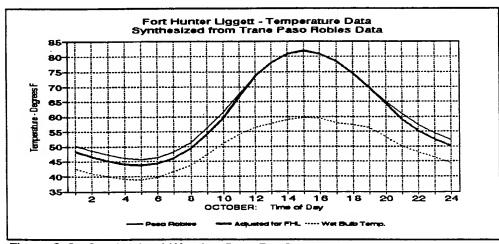


Figure C-6. Synthesized Weather Data For October.

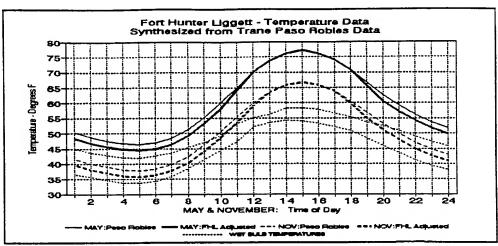


Figure C-7. Synthesized Weather Data For May and November.

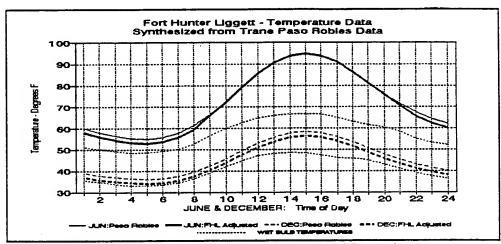


Figure C-8. Synthesized Weather Data For June and December.

Table C-1. Design Weather Data from TM 5-785.

				WINTER	BESIGN EATHG	A DATA	DEGREE			z	SURMER I	DESIGN DATA	ATA HE				æ	UMMER C AIR COI	CONDITION	21 9 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
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Centerville Beach Chico MAP China Lake NAF/Armitage Fld Chula Vista	333339 33239 3324 3324 331188 331188	124 21 121 51 117 41 117 05	280 238 2283 25 65	34 38 38 38	EE844 E6846	nagang nana	2833 2833 1839 1606	003 003 003 003 003 003 003 003 003 003	60 65 69 101 68 105 70 76 69 87	98000	20335	E CONS	800 800 800 800 800 800 800 800 800 800	68 7 7 68 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	22000	000000 00	04046	1410 2116 34 486	2002	388 426 438 438	
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Table C-2. Hourly Heating Degree-Hour Data for Fort Hunter Liggett, California. (based on 65 degrees F)

January 1,051 1,054 1,125 1,135 1,131 1,063 967 684 679 571 469 572 204 March 724 724 724 774 766 684 682 677 771 466 289 224 18 0 204 April 576 683 676 684 682 677 543 389 224 18 0	Time of Day	0100	0200	0300	0400	0200	0090	0020	0800	0060	1000	1100	1200	
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725 772 806 884 843 825 781 701 583 450 228 146 516 633 675 708 720 699 642 543 399 234 18 0 518 657 605 605 342 282 174 0	February	694	734	764	787	795	778	742	672	571	456	328	204	
576 633 677 708 720 689 642 543 389 234 18 0 218 567 605 622 623 577 490 366 220 28 0 210 270 284 366 342 284 189 71 0 0 0 0 4 130 189 226 270 282 260 202 93 0	March	725	772	908	834	843	825	781	701	583	450	298	146	
518 567 605 632 642 623 577 490 366 220 28 0	April	929	633	675	708	720	669	642	543	399	234	18	0	
t 130 270 318 354 366 342 282 174 0 0 0 0 0 0 0 0 0 0 0 0 0 0 109 174 226 267 279 282 269 150 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	May	518	292	605	632	642	623	277	490	366	220	28	0	
t 109 174 226 267 279 254 189 71 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	June	210	270	318	354	366	342	282	174	0	0	0	0	
t iiii iiii iiii iii iii iii iii iii ii	July	109	174	226	267	279	254	189	7	0	0	0	0	
mber 327 381 426 459 471 447 393 294 150 0 0 0 er 518 574 617 651 663 642 586 484 335 167 0 0 0 ober 755 810 879 861 981 873 763 657 539 431 ober 873 862 861 861 862 7793 7,190 6,082 4,627 3,59 2,061 1,296 ober 873 862 864 188 863 473 863 2,061 1,296 ober 140 150 1700 180 180 280 473 483 280 473 863 610 658 of Day 112 20 104 188 288 389 473 489 481 489 of Day 10 0 0	August	130	189	236	270	282	260	202	93	0	0	0	0	
er 518 574 617 651 663 642 586 484 335 167 0 0 ober 765 810 843 870 879 861 819 741 627 495 348 180 nber 871 908 933 955 961 849 915 863 675 539 2,061 1,896 431 of Day 130 140 1504 1704 1709 1900 2000 2100 2300 2300 1,296 of Day 130 140 150 1700 1800 1900 2000 2100 2001 1,296 2400 ny 211 127 96 127 202 313 450 586 698 803 817 1,296 ny 112 50 10 10 10 10 10 10 10 10 10 10 10 <td>September</td> <td>327</td> <td>381</td> <td>426</td> <td>459</td> <td>471</td> <td>447</td> <td>393</td> <td>294</td> <td>150</td> <td>0</td> <td>0</td> <td>0</td> <td></td>	September	327	381	426	459	471	447	393	294	150	0	0	0	
nber 765 810 843 870 879 861 819 741 627 495 348 180 nber 871 908 933 955 961 949 915 863 763 657 539 431 - 6,444 7,062 7,543 7,912 8,036 7,793 7,190 6,082 4,627 3,359 2,061 1,296 4 1,20 1,20 1,20 1,20 1,20 2,00 2,00 2,00 2,00 2,00 2,00 2,00 2,00 2,00 2,00 2,00 1,296 4,00 1,296 4,00 1,296 4,00 1,20 1,296 8,03 4,627 3,539 2,061 1,296 4,00 1,296 4,00 1,296 4,00 1,296 4,00 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,296 1,	October	518	574	617	651	663	642	586	484	335	167	0	0	
nber 871 908 933 955 961 949 915 863 763 657 539 431 - 6,444 7,062 7,543 7,912 8,036 7,733 7,190 6,082 4,627 3,359 2,061 1,296 - 6,444 7,062 7,543 7,912 8,036 7,793 7,190 6,082 4,627 3,359 2,061 1,296 of Day 130 1400 150 127 202 313 450 2100 2100 2300 2400 2400 ry 211 127 202 313 450 586 698 803 887 240 ry 211 127 202 313 450 586 453 658 629 689 ry 211 127 202 313 450 450 698 451 471 ry 21 21 22	November	765	810	843	870	879	861	819	741	627	495	348	180	
of Day 1300 1504 7,912 8,036 7,793 7,190 6,082 4,627 3,359 2,061 1,296 of Day 1300 1400 1500 1700 1700 1800 1900 2000 2100 2200 2300 2400 ry 211 127 96 127 202 313 450 586 698 803 887 949 ary 211 127 96 127 202 313 450 586 698 803 887 949 ary 211 127 96 104 188 288 389 473 549 610 658 ary 112 50 0 0 0 0 0 0 468 558 610 658 652 ary 0 0 0 0 0 0 0 0 0 0 148 148 148 <	December	871	806	933	955	961	949	915	853	763	657	539	431	
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ry 211 127 96 127 202 313 450 586 698 803 887 949 any 112 50 28 50 104 188 288 389 473 549 610 658 any 112 50 28 50 104 188 288 389 473 549 610 658 1 0 0 0 0 105 254 369 468 558 610 658 0 0 0 0 0 0 0 135 258 366 458 652 682 0	Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Total
any 112 50 28 104 188 288 389 473 549 610 658 1 0 0 0 105 254 369 468 558 629 682 1 0 0 0 0 0 468 558 629 682 1 0 0 0 0 0 0 456 629 682 1 0 0 0 0 0 0 456 456 522 1 0	January	211	127	96	127	202	313	450	586	869	803	887	949	16,346
Include the color of	February	112	20	5 8	20	2	188	288	389	473	549	610	658	11,026
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rber 0 0 0 0 0 0 117 207 273 rr 0 0 0 0 0 0 19 189 304 394 462 ber 45 0 0 0 36 162 306 417 513 600 669 723 ber 347 291 270 291 341 415 505 595 673 741 797 837 715 469 369 682 1,184 1,803 2,646 3,513 4,372 5,139 5,841	August	0	0	0	0	0	0	0	0	0	0	0	7	1,733
0 0 0 0 0 19 189 304 394 462 45 0 0 36 162 306 417 513 600 669 723 347 291 270 291 341 415 505 595 673 741 797 837 715 469 394 469 682 1,184 1,803 2,646 3,513 4,372 5,139 5,841	September	0	0	0	0	0	0	0	0	0	117	207	273	3,945
nber 45 0 0 0 36 162 306 417 513 600 669 723 nber 347 291 291 341 415 505 595 673 741 797 837 - 715 469 394 469 682 1,184 1,803 2,646 3,513 4,372 5,139 5,841	October	0	0	0	0	0	0	0	19	189	304	394	462	6,603
nber 347 291 270 291 341 415 505 595 673 741 797 837 - 715 469 394 469 682 1,184 1,803 2,646 3,513 4,372 5,139 5,841	November	45	0	0	0	36	162	306	417	513	009	699	723	11,709
. 715 469 394 469 682 1,184 1,803 2,646 3,513 4,372 5,139 5,841	December	347	291	270	291	341	415	505	595	673	741	797	837	15,838
	TOTAL	715	469	394	469	682	1,184	1,803	2,646	3,513	4,372	5,139	5,841	96,632

Table C-3. Hourly Cooling Degree-Hour Data for Fort Hunter Liggett, California. (based on 65 degrees F)

		1										
Time of Day	0100	0200	0300	0400	0200	0090	0000	0800	0060	1000	1100	1200
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	189
May	0	0	0	0	0	0	0	0	0	0	0	158
June	0	0	0	0	0	0	0	0	27	222	426	618
July	0	0	0	0	0	0	0	0	130	357	277	784
August	0	0	0	0	0	0	0	0	105	298	499	685
September	0	0	0	0	0	0	0	0	0	45	261	438
October	0	0	0	0	0	0	0	0	0	0	26	267
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	263	921	1,818	3,139

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Tota/
January	0	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0	0
March	16	87	112	87	22	0	0	0	0	0	0	0	322
April	321	411	444	411	333	213	%	0	0	0	0	0	2,376
May	273	347	378	347	282	177	22	0	0	0	0	0	1,984
June	765	861	897	861	777	642	486	330	168	18	0	0	7,098
July	942	1,045	1,085	1,045	955	812	642	474	329	198	65	0	9,440
August	828	921	928	921	840	710	558	403	273	155	31	0	8,184
September	570	657	069	657	582	459	318	174	21	0	0	0	4,872
October	403	493	527	493	415	291	143	0	0	0	0	0	3,088
November	0	24	51	24	0	0	0	0	0	0	0	0	66
December	0	o	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,117	4,845	5,142	4,845	4,206	3,304	2,222	1,381	790	371	96 .	0	37,463

Table C-4. Hourly Heating Degree-Hour Data for Fort Hunter Liggett, California. (based on 70 degrees F)

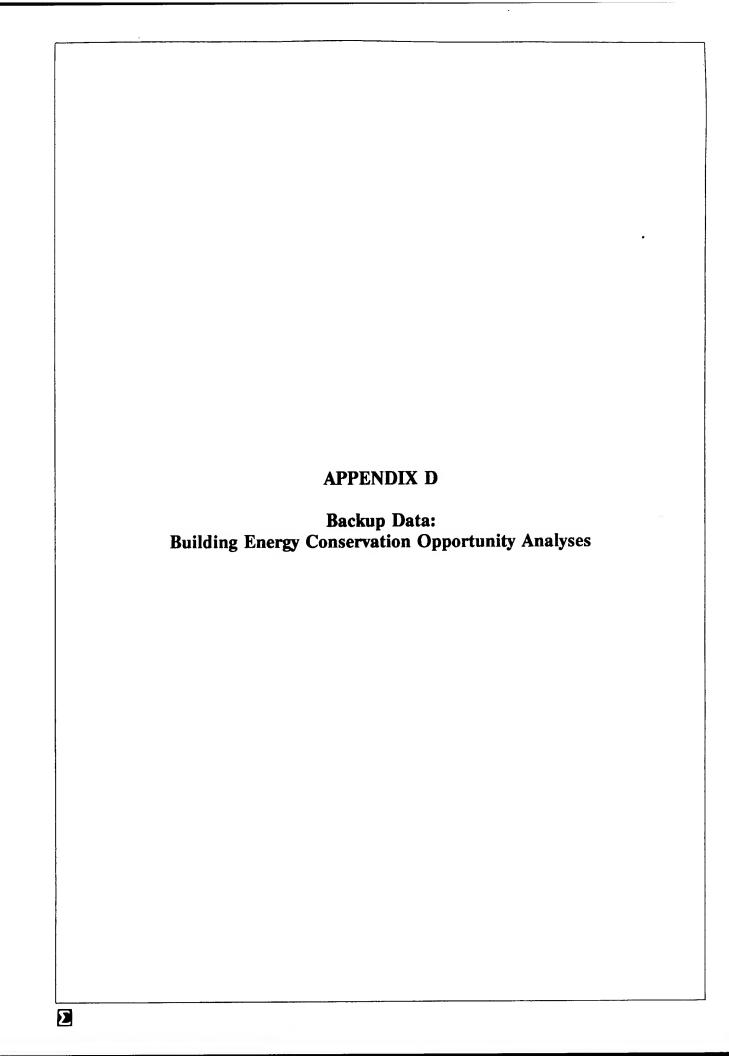
Time of Day	0100	0200	0300	0400	0200	0090	0200	0800	0060	1000	1100	1200
January	_	1,206	1,249	1,280	1,290	1,268	1,218	1,122	686	834	657	490
February		874	904	927	935	918	882	812	711	296	468	344
March		927	961	686	866	980	936	856	738	605	453	301
April		783	825	828	870	849	792	693	549	384	168	0
May		722	260	787	767	778	732	645	521	375	183	0
June		420	468	504	516	492	432	324	123	0	0	0
July		329	381	422	434	409	8 4	226	52	0	0	0
August		94 44	391	425	437	415	357	248	20	0	0	0
September		531	929	609	621	265	543	444	300	105	0	0
October		729	772	908	818	797	741	639	490	322	66	0
November	915	096	993	1,020	1,029	1,011	696	891	777	645	498	330
December	_	1,063	1,088	1,110	1,116	1,104	1,070	1,008	918	812	694	586
TOTAL	8,269	8,887	896,6	9,737	9,861	9,618	9,015	7,907	6,189	4,679	3,220	2,051

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Tota/
January		282	251	282	357	468	605	741	853	958	1,042	1,104	20,066
February	252	190	168	190	244	328	428	529	613	689	750	798	14,386
March		89	£	89	133	260	409	524	623	713	784	837	14,226
April	0	0	0	0	0	0	96	285	408	516	909	672	10,080
May	0	0	0	0	0	0	133	291	397	490	292	626	9,477
June	0	0	0	0	0	0	0	0	0	132	228	300	4,299
July	0	0	0	0	0	0	0	0	0	0	90	198	3,122
August	0	0	0	0	0	0	0	0	0	0	124	526	3,302
September	0	0	0	0	0	0	0	0	129	267	357	423	5,979
October	0	0	0	0	0	0	12	174	344	459	549	617	9,040
November	195	126	66	126	186	312	456	295	663	750	819	873	15,210
December	502	446	425	446	496	570	099	750	828	968	952	992	19,558
TOTAL	1,455	1,113	986	1,113	1,415	1,939	2,800	3,861	4,857	5,869	898'9	999'2	128,744

Table C-5. Hourly Cooling Degree-Hour Data for Fort Hunter Liggett, California. (based on 70 degrees F)

							666				9.000	
Time of Day	0100	0200	0300	0400	0200	0090	0020	0800	0060	1000	1100	1200
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	39
Мау	0	0	0	0	0	0	0	0	0	0	0	က
June	0	0	0	0	0	0	0	0	0	72	276	468
July	0	0	0	0	0	0	0	0	0	202	422	629
August	0	0	0	0	0	0	0	0	0	143	344	530
September	0	0	0	0	0	0	0	0	0	0	111	288
October	0	0	0	0	0	0	0	0	0	0	0	112
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	416	1,153	2,069

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Tota!
January	0	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0	0
April	171	261	294	261	183	ß	0	0	0	0	0	0	1.272
May	118	192	223	192	127	ส	0	0	0	0	0	0	877
June	615	711	747	711	627	492	336	180	18	0	0	0	5,253
July	787	890	930	890	800	657	487	319	174	43	0	0	7,229
August	673	992	803	992	685	555	403	248	118	0	0	0	6,033
September	420	202	540	202	432	309	168	24	0	0	0	0	3,306
October	248	338	372	338	260	136	0	0	0	0	0	0	1,804
November	0	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3,032	3,665	3,909	3,665	3,114	2,234	1,394	771	309	43	0	0	25,774



EEAP, Limited Energy Study Fort Hunter Liggett, California

APPENDIX D

Table of Contents

ECO

No. ECO Description

Architectural

A1	Caulk and Weatherstrip
A2	Install Double Glazing
A3	Insulate Exterior Walls
A4	Insulate Ceilings/Roofs
A5	Install Solar Film
A6	Reduce Glass Area
Δ7	Install Shading Devises

HVAC

B1	Install Load Shedding System (Local Controllers)
B2	Shade Condensers From Direct Sunlight
B3	Insulate Ductwork
B4	Insulate Piping and Fittings
B5	Install Outside Air Temperature Reset
B6/B7	Install Time Clocks and Provide Night Set Back/Setup
B8	Replace Inefficient Chillers
B9	Install Heat Recovery System
B10	Install Automatic Draft Damper Controls on Space Heating Equipment
B11	Install Economizer Cycle
B12	Install Boiler Oxygen Trim Controls and Revise Controls
B13	Install Evaporative Precoolers
B14	Install Multizone Controls
B15	Retrofit to Variable Air Volume
B16	Automate Summer/Winter Switchover (See B6/B7)
B17	Relocate Transformer
B18	Add Zone Optimizer to Reheat Systems
B19	Add Deadband Controls (See B6/B7)
B20	Consolidate Food Storage
B21	Replace Inefficient Boiler or Burner

EEAP, Limited Energy Study Fort Hunter-Liggett, California

ECO

No. ECO Description

DOMESTIC HOT WATER

- C1 Reduce Hot Water Temperatures
- C2 Insulate Hot Water Pipes
- C3 Insulate Hot Water Storage Tanks
- C4 Install Electrical Ignitors in Gas Hot Water Heaters
- C5 Install Aerators/Flow Restrictors in Lavatories and Showers
- C6 Use Cold Water for Laundering
- C7 Replace Electric Booster for Garbage Can Washer
- C8 Recover Heat From Dishwasher Hot Water
- C9 Install Automatic Draft Damper Controls on DHW Heaters

LIGHTING AND ELECTRICAL

- D3 Retrofit Exterior Lighting With HPS Fixtures
- D4 Replace Incandescent Lighting With Fluorescent
- D5 Install Electronic Ballasts and T8 Lamps
- D8 Improve Power Factor
- D9 Replace Motors With High Efficiency Units
- D10 Install FM Radio EMCS

COMPUTATION SHEET

Keller & Gannon
Engineers-Architects

COMPUTED BY BIH	ECO AL	PROJECT 16.403-10
CHECKED BY	CAULK & WEATHER STRIP	
REV 19	DOORS & WINDOWS	SHEET NO OF SHEETS

DESCRIPTION OF ACTION

Infiltration of outdoor air through gaps and cracks around openings in exterior walls increases HVAC energy use. Infiltrating outside air must be conditioned to inside temperature.

Infiltration is reduced with properly sealed openings, thus, HVAC energy use is reduced.

Facilities Included for Evaluation

Buildings included are listed in tabular calculations which Collow.

Energy Savings Calculations

Infiltration through Window & Door Cracks:

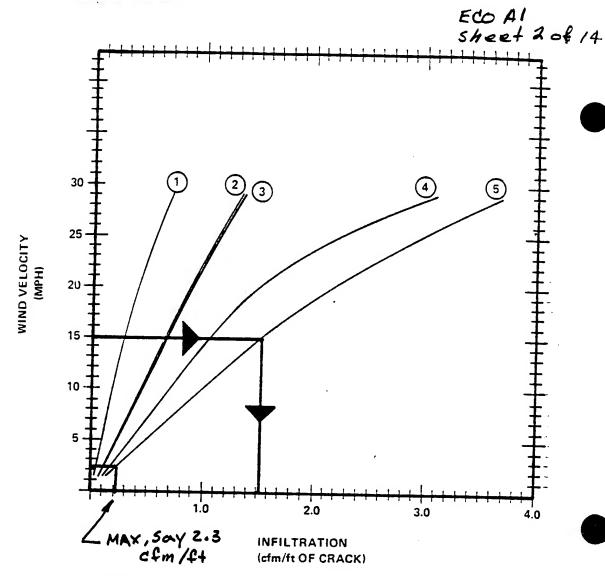
The affected nomograph is used to determine the infiltration vate based on the design condition wild speed @ TMS-785.

worst case Infiltration rate 2.3 CFM/LF CRACK Block load: Heating:

2.3 cm = 1.08 = (72-24)/1000 = 0.12 kBTUH wort does keating of = 56% to fuel savings (Propare most esponsive)

0.12/0.56 = 0.22 kBTUH

Continuous day-hr/yr @720=142,323



KEY	:		WEATHER	
NO.	TYPE	MATERIAL	STRIPPED	FIT
1.	ALL	WOOD	YES	AVERAGE
	HINGED	METAL	YES	AVERAGE
2.	ALL	WOOD	NO	AVERAGE
	HINGED	METAL	NO	AVERAGE
	DOUBLE HUNG	STEEL	NO	AVERAGE
3.	ALL	WOOD	YES	LOOSE
	DOUBLE HUNG	STEEL	YES	AVERAGE
4.	CASEMENT/STEEL	STEEL	NO	AVERAGE
5.	ALL	WOOD	NO	LOOSE
	DOUBLE HUNG	STEEL	NO	AVERAGE

WIND SPEED = 2 Knots = 2,2MPH.

COMPUTED BY BIH	ECO AI	PROJECT_16-403-10
CHECKED BY	CAULK & WEATHEDSTRIP	
	DOORS & WINDOWS	SHEET NO. 6 OF 14 SHEE

weatherstripping heating savings:

 $\frac{0.22 \times 142,323}{(72-24)} = 0.631 \times 10^6 \text{ Broker}$

fuel cost saved: \$ 7.87 x 0.631 = \$ 4.97/4r.- LF

weatherstrupping cooling energy savings:

(for Alt blays only - Evap cooled buildings will have no additional energy savings during cooling saason.)

Assume COP = 2.6 for "normal case" at FHL.

Heat Gain: 2.3 CEH =1.08 = (102 - 72)/1000

= 0.074 KBTUH

Cooling Energy use saved:

0.074 × 103 BTU : 3413 BTU/KWH = 8 WH/41-L

This would require about 1200 CF of crack per bldy to achieve \$11/41 Soun

=> neglect cooling energy sevings for this ECO as non-significants

EVALUATE WEATHERSTRIPPING ONLY
FOR HEATTING FUEL SAURGS

COMPUTATION SHEET

Keller & Gannon
Engineers-Architects

COMPUTED BY RIH	EGO Al	PROJECT 16.403.10
CHECKED BY	-	FRE REAP
DATE	CAULK & WEATHER STRIP	
	DOORS & WINDOWS	SHEET NO. 4 OF 14 SHEETS

CAULKING ENERGY SAUNGS

Caulking cracks around exterior openings will reduce infiltration as Loes weather-stripping, CFM savings are estimated at about 1/10 that of exact openings a nomograph on steet 2 of this calc. set.

0.23 CFM / LF Crack.

COST ESTIMATES

Unit prices for caulking are based on the 1993 Means Construction Cost Estimating Guide and are actually a little lower than the lowest unit cost provided by Means. In-house forces are not available to perform these tasks according to DEH at Fort Hunter Liggett.

Sheet 4.10 f 14

Bldg 131 Ope	enings				
Description	No. Ea	L	Н	Crack LF	Caulk LF
Window	14	28	48	233	177
Window	1	135	30	30	28
Door	2	3	7	5	3
Total				268	208
Bldg Floor Si	F:	998	LF/SF	0.27	0.21
Bldg 6 Openi	inas				
Description	_	L	W	Crack LF	Caulk LF
Window	6	32	48	104	80
Window	2	20	20	17	13
Window	6	25	33	75	58
Door	3	3	_7	7	5
Total				202	156
Bidg Floor Si	F:	1,090	LF/SF	0.20	0.16
Average, Bld	g 6 & 131		LF/SF	0.24	0.18

These factors used for bldgs 124,149,79

Bldg 81 Ope	nings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Door	4	44	86	115	87
Door	1	36	86	28	20
Door	1	72	86	34	26_
Total				176	133

Bidg 101 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Door C	1	78	75	26	26
Door E	1	102	120	37	37
Door H	1	88	99	31	31
Window D	2	84	96	0	60
Window G	4	64	63	106	85
Total				199	238
Window F	3	102	120	141	111
Window G	2	64	63	53	42
Window J	2	86	96	77	61
Total				271	214
Door K	18	36	84	360	360
Window A	16	67	84	515	403
Window L	4	84	84	112	112
Window M	8	24	48	128	96

ECO A1 INSTAL	L WEATHE	R STRIPPI	NG ANI	D CAULK AF	ROUND OPENIN
Window N	12	46	36	200	164
Window O	6	48	30	93	78
Total		40		1,408	1,213
rotai				1,400	1,210
Bldg 120 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window A	5	45	30	New	63
Window B	1	95	75	New	28
Door C	13	36	79	New	249
Door D	1	36	83	New	20
Window E/F	7	66	28	New	110
Roll-up Dr G	3	150	138	N/A Not	Conditioned
Window H	4	46	54	New	67
Window I	1	64	80	New	24
Window J	4	72	35	New	71
Dbl Door K	1	36	84	New	20
Door L	1	60	84	New	24
Total				0	676
				_	
Bldg 127 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Windows	12	66	30	222	192
Doors	2	36	84	40	40_
Total				262	232
	_				
Bldg 128 Ope	_	•			
Description	No. Ea	L	W		Caulk LF
Windows	52	60	48	New	
Doors	26	36	84	New	520
Total				0	1,456
Bldg 146 Ope	eninas				
Description	_	L	W	Crack LF	Caulk LF
Sliding Wind	4	66	33	77	66
Personnel D	2	36	84	40	40
Sliding Door	1	1120	96	203	203
Total				320	309
Bldg 161 thru	167 Ope	enings			
Description	No. Ea	L	W	Crack LF	Caulk LF
Sliding Wind	20	48	30	310	260
Personnel D	2	36	84	40	40_
Total				New	300

ECC Al

Sheets of 14

Bldg 186 Openings

Description	No. Ea	L	W	Crack LF	Caulk LF
Sliding Wind	10	60	48	NA	180
Personnel D	4	60	96	NA	104
Total				NA	284
Bldg 186 Ope	eninas				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window 5	1	48	70	NA	20
Window 6	1	48	216	NA	44
Window 4	6	36	66	NA	102
Window 3	2	18	54	NA	24
Door 1	1	72	96	NA	28
Door 3	2	36	84	NA	40
Window 2	4	72	72	NA	96
Door 2	1	36	84	NA	20
Door 20	1	72	96	NA	28
Total				NA	402
1014					
Bldg 186 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window A	2	32	60	Good Co	31
Window B	3	30	41	46	36
Door C	1	32	84	19	19
Door D	2	64	84	63	49
Window E	6	64	48	136	112
Total				264	247
Bldg 205, 207	7 208 229	a & 230	Open	inas	
Diag 200, 201 Description	•	1	•	Crack LF	Caulk LF
Sliding Wind	100	24	72	2,200	1,600
Single Door	9	3	84	131	131
Double Door		60	84	62	48
Total				2,393	1,779
				,	•
Bldg 241 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
S Wall Door	1	72	84	33	26
W Wall Wind	1	84	36	23	20
W Wall Door	1	60	84	31	24
N Wall Door	1	36	84	20	20
N Wall Door	1	72	84	33	26
E Wall Door	1	216	180	66	66
E Wall Door	2	72	84	52	52
E Wall Door	1	36	84	20	20
Total	·			278	254

Bldg 252 Op	eninas				
Description	No. Ea	L	W	Crack LF	Caulk LF
F Window	0	72	60	0	0
B Window	0	96	72	0	0
C Window	0	48	72	0	0
D Window	7	40	60	152	117
E Window	. 0	32	72	0	0
Door - Dbl	3	60	86	95	73
Door - Singl	5	36	86	102	102
Total				348	291
Pida OES On	oningo				
Bldg 256 Ope	•	L	W	Crack LF	Caulk LE
Description F Window	No. Ea	72	60	O O	Oauik LF
B Window	0 0	96	72	0	0
C Window	0	90 48	72	0	0
D Window	12	40 40	60	260	200
E Window	1		72	200	200 17
Door - Dbl	0	32 60	86	23	0
Door - Singl	2	36	86	41	41
Total			- 00	324	258
lotai				0L 1	200
Bldg 259 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
F Window	16	72	60	432	352
B Window	2	96	72	68	56
C Window	2	48	72	52	40
D Window	0	40	60	0	0
E Window	0	32	72	0	0
Door - Dbl	3	60	86	95	73
Door - Singl	10	36	86	203	203
Total				850	724
Bldg 290 Ope	eninas				
Description	•	L	W	Crack LF	Caulk LF
A Window	4	70	34	81	69
B Door - Sin	3	36	84	60	60
C Door - Dbi	4	72	84	132	104
D Window	1	48	30	16	13
E Window	1	48	36	New	14
Total	**************************************			288	260
DI4- 004 C	t				
Bldg 291 Ope	_	ı	14/	Ornals I F	O
Description	No. Ea	L	W	Crack LF	Caulk LF

ECO A1 INSTALL WEATHER STRIPPING AND CAULK AROUND OPENINGS
--

ECO Al Skeet 8 of 14

A Window	1	60	48	22	18
B Door - Dbl	1	72	84	33	, 26
C Door - Sin	1	36	84	20	20
D Roll-up Do	2	144	144	96	96
Total		-		171	160
Bldg 295 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Dbl Hng Met	91	72	63	2,525	2,048
Door - Dbl	2	60	84	62	48
Door-Single	9	36	84	180	180
Total				2,767	2,276

ENERGY SAVINGS CALCULATION:

Energy savings are determined per linear foot of crack in the preceding hand calculations. The energy savings per LF of crack is estimated at:

2.3 CFM/LF crack

Energy savings will actually be only 1/2 of this amount due to conservation of mass: infiltrating exterior air displaces conditioned air. Thus, infiltration may come in one side of the building while exfiltration occurs on the other side.

For weatherstripping, thus, assume:

1.15 CFM/LF crack

Heating energy is lost between the temperature of the outside air and the conditioned air. Assume conditioned space is at 72 Degrees, the heat losses are a function of the building schedule.

No. ECO A1 ECO A1 Mhrstrip Caulk Caulk	Crack LF Caulk LF 202 156 Bldg almost new wait to caulk & ws New: wait to c & ws		12,429 F	Heat E 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480	kWH/Yr h	kWH/Yr Mil BTU/Yr Mil - 2.8	Mil BTU/Yr	\$/Year \$0	\$22 \$\frac{\$22}{\}\$	\$\text{\$K\ear} & \text{\$K\ear}	\$\text{*22} \\ \frac{\$22}{\text{*22}} \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\$ Saved \$105	Constr In Cost \$ \$1,257	\$ \$1,402	Paybac Years 63.9	SIR 70.0
Whrstrip Caulk Yes Yes	Bldg almost wait to caulk Bldg almost wait to caulk Bldg almost wait to caulk Bldg almost walt to caulk Bldg almost wait t	Thew (& ws (R ws				All BTU/Yr M	B TU/Vr	\$//ear \$0	\$\text{\psi} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	\$//ear \$0 	\$\tag{\$22}{\tag{22}}\$		Cost \$ \$1,257	\$1,402	Years 63.9	0.07
γθς	Bidg almost wait to caulk New: wait to New: wait to New: wait to	156 Thew C & ws		1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480		δ. (2)		0\$	\$55	000	\$25		\$1,257	\$1,402	6.63	0.07
Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes	Bidg almost wait to caulk Bidg almost wait to caulk Bidg almost walt to caulk Bidg almost wait to caulk New: wait to New: New: Wait to New: Wait to New: New: Wait to New: New: Wait to New: New: New: New: New: New: New: New:	(& WS		1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480 1,480											•	·
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Yes Yes Yes Yes Yes	Bidg almost walt to caulk New: walt to Now: walt to	(& WS (& WS) C & WS) C & WS		1,480 1,480 1,480 1,480							•					
Yes Yes Yes Yes Yes	New: wait to caulk New: wait to New: wait to New: wait to New: wait to New: wait to	C & WS C & WS C & WS C & WS		1,480 1,480 1,480												'
Yes Yes Yes Yes	New: walt to New: walt to New: wait to New: wait to New: wait to New: wait to	C & WS C & WS C & WS		1,480 1,480 1,480												
Yes Yes Yes Yes	New: walt to New: walt to New: wait to New: wait to New: wait to	C & WS		1,480 1,480 1,480					-	•	•	-	•			
Yes Yes Yes	New: wait to New: wait to New: wait to New: wait to	C & WS		1,480				•	•	•		•	•			'
Yes Yes	New: wait to New: wait to New: wait to			1,480										,		
Yes	New: wait to New: wait to	C & WS						•				-	•			'
Yes	New: wait to	C & WS		1 480					ľ							
		C & WS		1.480					1	1						֓֟֓֟֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓
	New: wait to c.& ws	C & WS		1 480												
Yes	New: wait to c & ws	2 & W8		1 480												
250	,,,		H	3 5	18				•	•	·		•	•	•	•
e e	5	8	2,102	430	007	•	•	\$20	0,4	0.	\$20	\$30	\$215	\$239	12.0	0.00
V. 22	176	1	000			;			•	•	•			•	•	
193	0/1	3	10,830	//2	1	4.1	٠	0\$	\$32	0\$	\$32	\$153	\$1,092	\$1,218	38.2	0.125
F 101	66	238	12,750	318	•	0.9	•	6	<u>*</u>	Ç,	\$47	\$225	\$1,392	\$1,552	33.0	0.145
	271	214			•	11.7	•	0\$	\$92	0\$	\$92	\$440	\$1,693	\$1,887	20.5	0.233
	1,408	1,213	43,676	2,144	27,434	•	•	\$2,045	\$0	\$	\$2,045	\$9,182	\$8,985	\$10,018	4.9	0.916
P 116				745				•	'	ľ			•	•	1	'
			-	1,070												
T 120 Yes Yes	0	929	3,859	1,364				•	•	•	•		•	,	•	•
T 121				911				•	1.	•	•		•	•		
T 124 Yes Yes	537	417	33,065	1,480	†	75.3	•	\$0	\$593	9	\$593	\$2.838	\$3.347	\$3 732	6.3	0.761
T 127 Yes Yes	262	232	₩	1,364		34.7	•	9	\$273	\$0	\$273	\$1,309	\$1.684	\$1.877	+-	0.697
P 128	0	1,456	⊢	1,364		15.5		\$0	\$122	9	\$122	\$586	\$2.606	\$2.	+-	0.202
T 131 Y	-	52	+-	1 480		000		Ç.	\$70	Ş	\$70	4377	4417	1	+-	0 811

ECO Shuet 100+14 AI 0.406 0.336 0.402 0.113 0.124 0.107 0.405 0.146 0.401 0.113 0.113 SIR 0.761 44.5 13.5 14.2 6.3 42.2 42.2 42.2 42.2 42.2 11.8 11.9 11.9 11.7 32.8 42.2 38.7 Paybac \$2,342 \$1,115 \$599 \$599 \$599 \$1,920 \$599 \$599 \$599 \$599 \$16,464 \$567 \$16,464 \$16,464 \$16,464 \$16,464 Investmnt \$2,100 \$1,000 \$14,766 \$14,766 \$14,766 Constr \$208 \$719 \$1,722 \$14,766 \$14,766 \$537 Cost \$ \$537 \$537 \$537 \$537 \$537 \$682 \$6,596 \$6,615 \$6,686 \$68 \$68 \$68 \$68 \$68 \$70 \$5,531 \$6,664 က \$342 \$68 ည \$ Saved \$1,402 \$15 \$18 \$1,159 \$1,383 \$/Үөаг \$14 \$142 \$14 \$14 \$14 \$14 \$14 \$1,397 \$1,387 \$71 \$14 ECO A1 Energy Cost Savings N (Years) \$1,159 \$1,402 \$/Үөаг \$1,383 Ş င္အ \$18 \$1,397 \$1,387 Q Q 8 Fuel Oil Propane \$/Year \$0 \$15 \$142 ဖြွ 8 0\$ \$14 \$14 \$14 \$14 \$14 \$14 \$ \$71 \$177 \$/Year ٠ 8 8 8 ဒ္ဓ 0\$ 0\$ \$ Electric 8 8 8 8 8 S S S 2 2 ŝ 3.6 281.5 Electric Propane Fuel Oil kWH/Yr Mil BTU/Yr Mil BTU/Yr 232.8 280.5 277.7 278.5 ECO A1 Energy Savings 22.5 6. 8. 6. 6. 1.8 1.8 . 18.1 6. 9. FLH/Yr 756 756 756 756 756 758 758 953 2,626 453 453 1,364 756 ,022 568 756 1,163 756 2,626 1,364 756 756 756 392 1,137 2,626 1,364 281 1,480 0 1,364 281 146,849 146,849 146,849 146,849 146,849 2,295 BTUH 20,027 9,881 1,714 1,714 1,714 1,714 1,623 Heat Ld New Renov good and Caulk LF Total 1,779 1,779 1,779 1,779 1,779 Crack LF Caulk LF NA: Bldg not used 309 125 300 300 300 HVAC energy use NA: Not enough New New ¥ New New Ne₩ **3 3** 8 2 2 2 2,393 2,393 Total 2,393 2,393 2,393 320 160 A A S HVAC ECO Applicability ECO A1 Caulk Хөз Yes ¥ 68 **∀es** Yes Yes Yes ECO A1 Whrstrip Yes Yes Yes Хөз Yes Yes **Yes** Yes Yes Yes Yes Yes P 229A P 230 P 230A P 208A P 210 P 205A P 178 S 182 S 186 P 190 S 197 P 207 P 207A P 208 P 209 P 212 P 219 P 229 \$ 235 S 236 S 237 S 168 S 198 P 205 P 206 S 144 S 146 165 166 172 P 177 T 149 T 156 T 158 162 163 164 161

ECO Al Sheet 11 of 14

Fac	HVAC EC	O Applicat	Fac HVAC ECO Applicability				ECO A1 E	Energy Savi	nergy Savings	ECO A1 Energy Cost Savings N (Years)	nergy Cos	t Savings	N (Years)	5	Cost Analysis	Sis		
ġ	ECO A1	ECO A1	Total	Total	Heat Ld	Heat	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	ည	Constr	Investmnt	Paybac	SIR
	Whrstrip	Caulk	Crack LF	Caulk LF	ВТОН	FLH/Yr KWH/Yr	_	Mil BTU/Yr	Mil BTU/Yr	\$/Үөаг	\$/Уеаг	\$/Year	\$/Year	\$ Saved	Cost \$	€	Years	
S 238						756				•		•	'	1	,	•	,	
P 240						756					•	·	•			•	*	1
S 241		Уөз	278	254	17,334	756	•	19.7	•	0\$	\$155	0\$	\$155	\$743	\$1,800	\$2,008	12.9	0.370
\$ 243						756					•			•				
S 244						756					•	-	1		•		•	
S 246						756				•	·	•		·				-
S 247						756					•	·	,	•	•	•	'	
P 252	Уөѕ	Уөз	348	291	21,537	625	٠	•	18.4	0 \$	0\$	\$92	\$92	\$438	\$2,205	\$2,459	26.8	0.178
P 256	Yes	Уөв	324	258	19,985	625	•	•	17.4	\$0	0\$	\$87	\$87	\$414	\$2,030	\$2,264	26.1	0.183
P 259	Yes	Yes	850	724	52,691	625	•	•	44.6	0\$	0\$	\$222	\$222	\$1,059	\$5,411	\$6,033	27.2	0.176
S 283						288				•	,	•			•	•	•	
\$ 286						756					·			•	•		•	
P 287						410					•	•	•	•	•	•	'	
S 288						756					٠	•	•	•	•	•	•	ľ
S 290	⊀ 08	∀	288	260	17,951	952	•	21.3	•	0\$	\$168	O \$	\$168	\$802	\$1,861	\$2,075	12.4	0.387
S 291	Уөз	Уөз	171	160	10,684	756	٠	13.5	•	0\$	\$106	\$	\$106	\$509	\$1,114	\$1,242	11.7	0.410
P 295	Yes	Уөз	2,767	2,276	171,099	1,364	•	391.1	•	0\$	\$3,078	O\$	\$3,078	\$14,745	\$17,469	\$19,478	6.3	0.757
P 301						756 2,626					•	ı	•	ı				
P 642						Ϋ́					ľ	•	•	•			•	1
S 2201						Ħ					•		٠				•	ľ
Totals			20,889	21,397			27,703	670	1,435	\$2,065	\$5,271	\$7,146	\$14,483	\$68,609	\$138,215	\$154,110	10.6	0.445
															NO BUILDI	NO BUILDINGS HAVE	AN SIR >	> 1.0

CONSTRUCTION COST E	STIMAT	Έ		Pate Prepared February	1993	Sheet 12 Of	14
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study					Code A	(no design compe	ted)
Fort Hunter-Liggett, California				· · · · · · · · · · · · · · · · · · ·			·
Engineer-Architect							
Keller & Gannon Drawing No.		Estimat	or		Checked	Ву	
ECO# A-1 Caulk & Weatherstrip			BIH				
		antity		Labor	1	Material	_:.
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Weatherstripping	1	LF	\$1.89	\$1.89	\$1.19	\$1.19	\$3.08
Subtotal							\$3.08
Sales Tax at 8%							\$0.2
Subtotal							\$3.3
Contractor OH & P							\$1.0
Subtotal							\$4.3
Bond at 1%							\$0.0
Subtotal							\$4.3
Estimating Contingency at 10%			 		1		\$0.4
Total Probable Construction Cost		<u> </u>					\$4.8
Total Topapio Collettaction Cost		<u> </u>					·····
	-	<u> </u>					
				Î .	1		
		<u> </u>			1		
				1			
		1					

				Date Prepared		Sheet 13 Of	14
CONSTRUCTION COST ES	TIMAT	Έ		February	1993		
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study							
Location					Code A	(no design compo	eted)
Fort Hunter-Liggett, California					<u> </u>		
Engineer-Architect							
Keller & Gannon Drawing No.	- **	Estimat	or		Checked	Bv	
ECO# A-1 Caulk & Weatherstrip			BIH			-,	
200 " / () Caam a Weamership	Qu	antity	<u> </u>	Labor		Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Caulking	1 1	LF	\$1.00	\$1.00	\$0.15	\$0.15	\$1.15
Subtotal							\$1.15
Sales Tax at 8%							\$0.09
Subtotal							\$1.24
Contractor OH & P	1						\$0.37
Subtotal	1						\$1.61
Bond at 1%							\$0.02
Subtotal	1						\$1.63
Estimating Contingency at 10%	1						\$0.1€
Total Probable Construction Cost	İ				<u> </u>		\$1.79
7 19 19 19 19 19 19 19 19 19 19 19 19 19	†	 					
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			L	L	L		

Life Cycle Cost Analysis Summary ECO A-1 Energy Conservation Investment Program (ECIP) Sheet 14 of 14

		nerstrip Doors and W	Region No. 4 /indows		Project No. 16-403-10 Fiscal Year FY96
	tion Name: ECO#	⁻ A-1			D. LETTER & CANDION
Analysis Dat	e: March 1993		Economic Life:	5 YEARS	Preparer: KELLER & GANNON
1. Investmen	nt Costs				•
A. Construct	ion Costs		\$138,215		
B. SIOH			\$7,602	•	
C. Design Co	ost		\$8,293	•	
_	t (1A+1B+1C)		\$154,110	•	
	alue of Existing E	guipment			
•	ity Company Reb				
	estment (1D-1E-1F				\$154,110
	avings (+)/Cost(-):				
Date of NIST	TR 85-3273-X Use	d for Discount Facto	ors		
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
Cource	ψ,ιιτ 20,(1)				
A. Elec.	\$21.84	94.2	\$2,057	4.49	\$9,236
B. Dist	\$4.98	1435	\$7,146	4.77	\$34,088
C. Propane	\$7.87	670	\$5,273	4.79	\$25,257
D. Other					
E. Demand S	Savings				
F. Total			\$14,476		\$68,581
3. Non Energ	gy Savings (+) or	Cost (-):		_	
			\$0		
	ecurring (+/-)			4.45	
	Factor (Table A)	70 A 0 A 4 \			
(2) Discount	ed Savings/Cost (3A X 3A1)			Ψ0
B. Non Recu	ırring Savings (+)	or Cost (-)			
Item	Savings(+)	Year of	Discount	Doscounted	i Sav-
item	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cos	
	COSI(-)(1)	Occur. (2)	1 4001(0)	gs(-()()
a.					
b.			_		
C.					
d. Total					
C Total Non	Energy Discounte	ed Savings (3A2+3E	3d4)	\$0	
4. Simple Pa	ayback 1G/(2F3+3	3A+(3Bd1/Economi	c Life)):		10.6 Years
	Discounted Savin		•••	\$68	3,581
	Investment Ratio	• •			0.45
	Internal Rate of Re			-20	0.86%

Keller & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO A2	PROJECT 16-403-10 FHL EEAP
DATE MARCH 1993	INSTALL DOUBLE	
REV19	GLAZING - WINDOWS	SHEET NOOF SHEETS

Description

bouble glazed windows reduce heat.

transfer. Both space heating and
cooling energy are saved. Double
glazing, as a retrofit, requires a
climate with below freezing winters
and/or very warm summers.

Analysis

Basod on experience evaluating this type of project as a vetrofit at many locatroins of divergent climates, retrofitling FHL windows for double glazing will not be economic.

This project is not evaluated for FHL.

The facility Engineer is encoraged, however, to consider using double glazed panels for glass replacements when in conditioned spaces. Installation and materials costs are about the same as for standard pane glass as the manufacture of double glazed panels is automated.

Keller & Gannon

Engineers-Architects

COMPUTED BY PUB	ECO A3		PROJECT 16-403-10
CHECKED BY 515 DATE MARCH 1973	INSULATE	EXTENOR	TILLERAN
REV 19	WALLS		SHEET NO. 1 OF 19 SHEETS

DESCRIPTION OF ACTION

EXTERIOR IDAN IHSULATION LINE BE HOLLIED

FACILITES HOLLIDED

252 4

BLDG 194 ECO LOT RECOMMENTOED DUE TO BUILDING USE
156 ECO LOT RECOMMENTOED THE TO BUILDING FLITCHION
3055 177 **

4 BUILDING AHALTSED LISHER PERFECTATIONE
TTERE 600 AHALTSIS

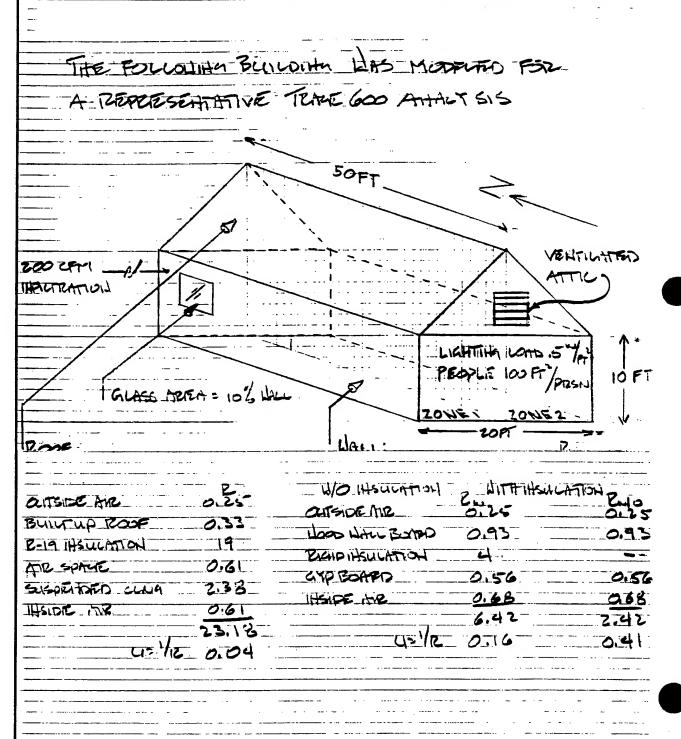
++ BUILDING FINDELLED USING TRACE 600

FORM 101-1/8

Keller & Gannon

Engineers-Architects

7 1/1		HOUTE EXTERIOR LITTLES	PROJECT 13-433-13 FITTL PERP SHEET NO. 2 OF 14 SHEETS
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Ecot A-4

411177 75-14 PAGE 5

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

Total

-37.2

PTAC - PACKAGED TERMINAL AIR COND. System Peak Mo/Hr: 7/18 Mo/Hr: 13/ 1 Mo/Hr: 7/18 Peaked at Time ==> CADE: 91 QADE: 27 QADB/WB/HR: 91/ 68/ 70.0 Outside Air ==> Net Percnt * Space Percnt * Space Peak Coil Peak Percnt Ret. Air Ret. Air Space Total Of Tot * Tot Sens Of Tot Sensible Of Tot * Space Sens Sensible Latent Sens.+Lat. (Btuh) (%) * (%) * (Btuh) (Btuh) (Btuh) (%) Envelope Loads (Btuh) (Btuh) (Btuh) 0 0.00 * 0 0.00 * 0 0 0.00 Skylite Solr 0 0 0.00 * 0 0 0 0.00 * 0 0.00 Skylite Cond 0 0 0.00 * 0 2,272 3.92 * 0 -1,468 5.16 Roof Cond 0 2,272 16,940 29.25 * 39.05 * 0 18.550 0 Glass Solar 16,940 0 2,002 3.46 * 3.21 * -6,291 -6,291 0 1,523 22.11 Glass Cond 2,002 30,702 53.01 * 23,224 48.89 * -16,474 -20,688 72.72 Wall Cond 24,108 6,594 0.00 * 0 0.00 * ٥ ٥ 0.00 0 Partition 0 0.00 * 0.00 * 0 0 0 0.00 Exposed floor 0 0 0.00 * 0 0.00 * 0 0 0 0.00 Infiltration 0 91.14 * 51,915 89.63 * -22,765 -28,447 43,297 Sub Total==> 43.050 8,865 100.00 Internal Loads 2.95 * 3.59 * 1,707 ۵ 1,707 0 0.00 Lights 1.707 0 3.79 * 7.42 * 0 0 4,300 1,800 0.00 People 4,300 0.00 * 0 0.00 * 0 n 0 0.00 Hisc 0 0 0 7.38 * 10.37 * 0 0 Sub Total ==> 6,007 0 6,007 3.506 0.00 1.48 * -515 0.00 * 0 0 704 0.00 Ceiling Load 812 -812 0.00 * 0.00 * 0 Λ 0 0.00 Outside Air Ω 0 0 0.00 * 0.00 * 0 0 0.00 Sup. Fan Heat 0.00 * 0.00 * 0 0 0.00 Ret. Fan Heat 0.00 * 0.00 * ٥ Duct Heat Pkup a 0 0.00 0.00 * 0.00 * 0 0 0.00 OV/UNDR Sizing 0 0.00 * 0.00 * ٥ 0.00 0 Exhaust Heat 0.00 * 0.00 * 0 0.00 0 0 Terminal Bypass 0 -28,447 100.00 100.00 * -23,280 8,054 57,922 100.00 * 47,507 Grand Total ==> 49,868 -----AREAS----------COOLING COIL SELECTION-----Total Capacity Sens Cap. Coil Airfl Entering DB/MB/HR Leaving DB/WB/HR Gross Total Glass (sf) (%) Deg F Deg F Grains Deg F Deg F Grains Floor 1,000 (Tons) (Mbh) (Mbh) (cfm) 61.2 57.3 0 77.5 63.3 66.9 66.0 Part 3,170 57.9 55.4 Main Clg 4.8 0 0.0 0.0 0.0 0.0 0.0 0.0 ExFir 0 0.0 Aux Clg 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Roof 1,000 0 0 Opt Vent 0.0 0.0 0.0 Vall 1,400 140 -: 10 4.8 57.9 Totals -----AIRFLOWS (cfm)------- ENGINEERING CHECKS---- TEMPERATURES (F)---------HEATING COIL SELECTION-----Type = Clg Htg --Cooling Heating Clg % OA 0.0 Capacity Coil Airfl Ent Lvg Type -0 3.17 SADE 61.2 74.8 Clg Cfm/Saft (cfm) 0 (Mbh) Deg F Deg F Vent 0 ٥ Clg Cfm/Ton 656.65 Plenum 77.6 63.7 Main Htg -37.2 3,170 63.9 74.8 Infil 207.18 Return 77.5 64.2 3,170 3,170 Clg Sqft/Ton Aux Htg 0.0 0 0.0 0.0 Supply Clg Stuh/Saft 57.92 Ret/QA 77.5 64.2 0 ٥ -0.0 3.170 64.2 61.2 Mincfm Preheat 3,170 10 Runernd 75.0 68.0 3,170 No. People 0.0 0 0.0 0.0 Return 0 0 0.0 Fn MtrTD 0.0 0.0 Hta % CA 0.0 0.0 0.0 Exhaust Humidif ۵ Htg Cfm/SqFt 3.17 Fn BldTD 0.0 0.0 ٥ 0.0 0.0 Rm Exh Opt Vent 0.0 Fn Frict 0.0 0 0 Htg Btuh/SqFt -37.22 0.0 Auxil

ECO" A-3

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

System Peak PTAC PACKAGED TERMINAL AIR COND. Peaked at Time ==> Mo/Hr: 7/18 Mo/Hr: 7/18 Mo/Hr: 13/ 1 Outside Air ==> OADB: 91 OADB/WB/HR: 91/ 68/ 70.0 OADB: 27 Space Ret. Air Ret. Air Net Percnt * Space Percnt * Space Peak Coil Peak Percnt Sens.+Lat. Total Of Tot * Sensible Of Tot * Sensible Latent Space Sens Tot Sens Of Tot Envelope Loads (Btuh) (Btuh) (Stuh) (%) (Btuh) (%) * (Btuh) (%) (Btuh) (Btuh) Skylite Solr 0 0 0 0.00 0 0.00 * 0 ٥ 0.00 Skylite Cond 0.00 * 0.00 * Ω 0 0 0 ٥ 0 0.00 0.00 * Roof Cond 1,958 5.01 * 0 1,958 n 0 -1,508 9.47 47.42 * 56.57 * Glass Solar 18,550 0 18,550 18,550 0 0 0.00 Glass Cond 1,523 0 1,523 3.89 * 1,523 4.64 -6,291 -6,291 39.53 Wall Cond 28.33 8,671 26.44 8,671 2,410 11,081 -6,429 -8.117 51.00 Partition 0 0 0.00 ٥ 0.00 0 ٥ 0.00 Exposed Floor 0 0 0.00 0 0.00 0 n 0.00 Infiltration 0 0 0.00 0 0.00 ٥ n 0.00 Sub Total ==> 84.65 28.744 4.369 33.112 28.744 87.66 -12,720 -15,916 100.00 Internal Loads 1,707 1,707 4.36 * Lights 1,707 ٥ 5.20 * 0 0 0.00 1,800 People 4,300 10.99 * 5.49 4,300 0 0 0.00 Misc 0.00 * 0 0.00 * 0 0 0 0 0 0.00 Sub Total ==> 15.35 * 3,506 10.69 * Λ 6,007 0 0 6,007 0.00 Ceiling Load 540 474 -474 0 0.00 * 1.65 -418 0.00 Outside Air 0.00 * 0.00 0 0 0.00 Sup. Fan Heat 0.00 * 0.00 0.00 Ret. Fan Heat 0.00 * 0.00 0.00 Duct Heat Pkup 0.00 0 ٥ 0.00 0 0.00 OV/UNDR Sizing 0 0.00 0.00 0 0.00 Exhaust Heat 0.00 0 0.00 0 0.00 Terminal Bypass 0.00 0.00 0 0.00 Grand Total==> 35,225 3,894 39,119 100.00 * 32,790 100.00 * -13,138 -15,916 100.00 ------COOLING COIL SELECTION-----------AREAS-----Entering DB/WB/HR Total Canacity Sens Cap. Coil Airfl Leaving DB/WB/HR Gross Total Glass (sf) (%) Deg F Deg F Grains (Tons) (Mbh) (Hbh) (cfm) Deg F Deg F Grains Floor 1.000 Main Clg 3.3 39.1 62.9 60.3 36.6 2,064 76.5 66.9 56.6 64.8 Part 0 Aux Clg 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 ExFlr 0 Opt Vent 0.0 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 Roof 1.000 0 0 Totals 3.3 39.1 Vall 1,400 140 > 10 ------HEATING COIL SELECTION---------- AIRFLOWS (cfm)------- ENGINEERING CHECKS---- TEMPERATURES (F)---Capacity Coil Airfl Heating Clg % OA 0.0 Type - Clg .. Htg = Ent Type = Cooling Lvg (Mbh) (cfm) 0 0 Clg Cfm/Sqft 60.3 73.9 Deg F Deg F Vent 2.06 SADE **Hain Htg** -20.5 2,064 64.7 73.9 Infil 0 0 Clg Cfm/Ton 633.22 Plenum 76.5 64.7 Aux Htg 0.0 0 0.0 2,064 2,064 ~ Clg Sqft/Ton 306.76 76.5 0.0 Return 65.0 Supply Clg Stuh/Sqft Preheat -0.0 2.064 65.0 60.3 0 0 39.12 Ret/OA . 76.5 65.0 Minefa Reheat 0.0 Runernd 75.0 0 0.0 0.0 2.064 2.064 No. People 10 68.0 Return: Humidif 0.0 Fn MtrTD 0.0 Ω 0.0 0.0 **Exhaust** 0 0 Htg % CA 0.0 0.0 Opt Vent 0.0 0 0 0.0 0.0 Rm Exh 0 Htg Cfm/SqFt 2.06 Fn BldTD 0.0 Total -20.5 **Auxil** 0 Htg Btuh/Sqft -20.52 Fn Frict 0.0

V 600 PAGE 2

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

BUILDING 177 (TECH LIBRARY)

FHL

FHL

KELLER AND GANNON

USE MODIFIED PASO ROBLES WEATHER DATA

PASORO	BL
35.0	(deg)
120.0	(deg)
8	
765	(ft)
29.1	(in. Hg)
1.05	
0.95	
100	(F)
70	(F)
27	(F)
0.20	
0.20	
0.0738	(Lbm/cuft)
0.2444	(Btu/lbm/F)
1.0829	(Btu-min./hr/cuft/F)
4,766.9	(Btu-min./hr/cuft)
4.4302	(Lb-min./hr/cuft)
	120.0 8 765 29.1 1.05 0.95 100 70 27 0.20

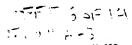
Design Simulation Period: June To November
System Simulation Period: January To December
Cooling Load Methodology: TETD/Time Averaging

Time/Date Program was Run:

16:25:49 3/ 7/93

Dataset Name:

177INSUL .TM



-25.55

Htg Btuh/Sqft

Fn Frict

0.0

V 600 PAGE 3

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

Total

-92.0

PTAC - PACKAGED TERMINAL AIR COND. System Peak ****************** CLG SPACE PEAK ********** HEATING COIL PEAK ******** Mo/Hr: 7/17 Mo/Hr: 13/ 1 Mo/Hr: 8/16 Peaked at Time ==> **CADB: 96** OAD8: 27 OADB/WB/HR: 95/ 72/ 84.0 Outside Air ==> Percnt * Space Peak Coil Peak Ret. Air Ret. Air Net Percnt * Space Percnt Space Of Tot * Total Of Tot * Sensible Space Sens Tot Sens Of Tot Sens.+Lat. Sensible Latent Envelope Loads (Btuh) (Btuh) (Btuh) (Btuh) (%) (Btuh) (%) * (Btuh) (Btuh) (%) Skylite Solr 0 0 ۵ 0.00 0 0.00 * 0 0 0.00 0 0.00 * 0 0.00 * 0 0 0.00 Skylite Cond Λ n 0.00 * 2.69 * 0 0 -1.564 2.18 Roof Cond 0 3,527 3,527 68,239 60.20 * 49.87 ٥ Ω 0.00 Glass Solar 65,442 0 65,442 3.80 * 4,305 -14,073 4,512 3.44 * -14,073 19.62 Glass Cond 4,512 0 7.46 * 7,818 5.96 8,459 -22,628 -28,903 40.31 Wall Cond 6,225 1,594 0 0 0.00 0 0.00 * 0 0 0.00 Partition 0 0.00 0 0.00 * 0 0 0.00 n Exposed Floor 2.70 * 5,276 4.02 3,065 -8,880 -8,880 12.38 Infiltration 5.276 65.98 84,068 74.17 -45,581 -53,420 74.49 86,574 Sub Total ==> 81,454 5,121 Internal Loads 23.891 21.08 * 0 0.00 Lights 23,891 0 23,891 18.21 0 3,360 1,520 1.34 0 0 0.00 2.56 People 3,360 2.71 0 0 0.00 3,072 3,072 2.34 * Misc 3,072 0 25.13 * 0 28,483 0 0.00 30,323 30,323 23.11 * Sub Total ==> 0 0.71 * -1,020 ٥ 801 0.00 0 0.00 Ceiling Load 1,509 -1,509 14,997 0.00 * n -20,173 11.43 28.13 Outside Air 0 0 0.00 * 0.00 * 0 0.00 Sup. Fan Heat 0 0 0 0.00 * 0.00 * 0 0.00 Ret. Fan Heat 0.00 * 0.00 * 0 0.00 Duct Heat Pkup 0 0 0.00 * 0.00 * 0 0.00 0 OV/UNDR Sizing -0.51 * 0.00 * 1,883 -2.63 -674 -674 Exhaust Heat 0 Terminal Bypass 0.00 * 0 0.00 0 0.00 0 113,351 100.00 * -46,602 -71,711 100.00 Grand Total ==> 113,285 2,937 131,220 100.00 * ------COOLING COIL SELECTION----------AREAS-----Leaving DB/WB/HR Gross Total Glass (sf) (%) : Entering DB/WB/HR Total Capacity Sens Cap. Coil Airfl Deg F Deg F Grains 3.600 Floor (Tons) (Mbh) (Mbh) (cfm) Deg f Deg f Grains 0 Hain Clg 120.8 7,698 76.6 63.2 68.1 61.4 57.6 67.2 Part 10.9 131.2 0 0.0 0.0 0.0 0.0 ExFlr 0 Aux Clg 0.0 0.0 0.0 0.0 0.0 Opt Vent 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 Roof 900 0 . 0 Wall 2,600 355 - 14 10.9 131.2 Totals -- ENGINEERING CHECKS---- TEMPERATURES (F)--------HEATING COIL SELECTION---------- AIRFLOWS (cfm)-----Type - Cooling Heating Cla % OA 8.5 Type - Clg . Htg -Capacity Coil Airfl Ent -Lvg 651 454 - Clg Cfm/Sqft 2.14 SADE 61.4 73.6 . (Mbh) (cfm) Deg F Deg F Vent 200 703.98 Plenum -76.3 64.7 200 -Cla Cfm/Ton **Main Htg** -92.0 7,698 62.6 73.6 Infil 7.698 329.22 Return 75.6 65.1 7,696 Clg Sqft/Ton Aux Htg 0.0 0 0.0 0.0 Supply ٥ Clg Btuh/Sqft 36.45 Ret/QA 76.6 62.9 7,698 0 Preheat -0.0 61.9 61.4 **Hincfm** 7,698 No. People 8 Runernd 75.0 68.0 0 7,648 Reheat 0.0 0.0 0.0 Return Fn MtrTD 601 454 - Htg % OA 5.9 0.0 0.0 Humidif 0.0 0.0 0.0 Exhaust Fn BldTD Opt Vent 0.0 0.0 0.0 Rm Exh 100 -2 0 Htg Cfm/SqFt 2.14 0.0 0.0

Auxil

0

STEET 7 OP 14 EW # A ?

V 600 PAGE 5

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

- PACKAGED TERMINAL AIR COND. System Peak PTAC Mo/Hr: 7/17 Mo/Hr: 13/ 1 Mo/Hr: 8/16 Peaked at Time ==> CADE: 96 OADB: 27 QADB/WB/HR: 95/ 72/ 84.0 Outside Air ==> Percnt * Net Percnt * Space Peak Coil Peak Percnt Space Ret. Air Ret. Air Space Of Tot * Total Of Tot * Space Sens Tot Sens Of Tot Sensible Sens.+Lat. Sensible Latent (%) * (Btuh) (%) (%) * (Btuh) (Btuh) (Btuh) (Btuh) Envelope Loads (Btuh) (Btuh) 0.00 * ۵ 0.00 * 0 0 0.00 0 Skylite Solr 0 0 0.00 * 0.00 * Ω ۵ ۵ 0.00 0 Skylite Cond 0 0 0.00 * 2.70 3,525 2.79 * n a -1.595 Roof Cond 0 3,525 62.64 * 51.72 * 68,342 Λ Λ 0.00 0 65,442 Glass Solar 65.442 3.97 * 4,334 -14,073 -14,073 24.58 4,512 4,512 3.57 * 0 Glass Cond 3.73 * -11,314 3,912 3.09 * 4,067 -14,526 25.37 800 Wall Cond 3,112 0.00 * ٥ 0.00 * 0 0 0 0.00 0 Partition 0.00 * 0 0 0.00 * 0 0 0.00 0 **Exposed Floor** 5,276 2.95 * -8,880 -8,880 15.51 4.17 * 3,222 Infiltration 5,276 65.34 * 79.965 73.29 * -34,267 -39,075 68.24 82,666 78,341 4,325 Sub Total ==> Internal Loads 21.90 * 0.00 23,891 18.88 * 23.891 0 0 23.891 Lights 0.00 1,520 1.39 * ٥ 0 3,360 3,360 2.66 * People 2.82 * 0.00 3,072 3,072 Ω Ω 0 3,072 2.43 * Misc O 23.97 * 26.10 * 0 0.00 28,483 30,323 0 30.323 Sub Total ==> 0.00 * 664 -0.61 * -644 -0 0.00 -1,470 0 Ceiling Load 1,470 0.00 * 0 -19,403 33.89 14.104 - 11.15 * Outside Air 0 ۵ 0.00 * 0 0.00 0.00 . * 0 Sup. Fan Heat 0 0.00 * 0.00 * 0 0.00 -Ret. Fan Heat 0 0.00 * 0 0.00 0 0.00 * Duct Heat Pkup Ω 0.00 * Λ 0.00 0 0.00 * OV/UNDR Sizing 0 0.00 * 1,220 -2.13 -573 -0.45 * Exhaust Heat -573 0 0.00 * 0.00 * 0 0.00 0 Terminal Bypass 0 0 100.00 * -34,912 -57,258 100.00 126,520 100.00 * 109,111 . 0 Grand Total==> 110,134 2,282 ------COOLING COIL SELECTION----------AREAS-----Leaving DB/WB/HR -Gross Total Glass-(sf) (%) Total Capacity Sens Cap. Coil Airfl Entering DB/WB/HR Deg F Deg F Grains Floor 3,600 Deg F Deg F Grains (Tons) (Mbh) (Hbh) (cfm) 61.4 57.6 0 76.4 63.2 68.1 66.9 Part 126.5 116.5 7,419 Main Cla 10.5 0.0 % 0.0 % 0.0 0.0 ExFir 0 0.0 0.0 0 0.0 0.0 Aux Clg 0.0 0.0 0.0 0.0 0.0 900 % 0 ~. 0 0 0.0 0.0 Roof 0.0 0.0 Opt Vent 0.0 Wall 2,600 355 7 14 10.5 126.5 Totals -- ENGINEERING CHECKS----TEMPERATURES (F)---------HEATING COIL SELECTION----------AIRFLOUS (cfm)-----Type - Cooling - Heating Type= Clg a Htg= Cla X QA 8.4 Capacity Coil Airfl Ent ~ Lvg = 437 Clg Cfm/Sqft 2.06 - SADB - 61.4: 72.3 622 ~~ (Mbh) (cfm) Deg F Deg F Vent -200 🖘 200 - Clg Cfm/Ton 703.67 Plenum - 76.3 65.6 7,419 - 63.7 Main Htg -69.8 72.3 Infil 7,419 7,419 Clg Sqft/Ton 341.45 Return 75.5 66.2 Aux Htg 0.0 0 0.0 0.0 Supply 0 Clg Btuh/Sqft 35.14 Ret/QA = 76.4 - 63.9 0 -Preheat -0.0 7,419 62.9 61.4 Minefa 7,419 Runarnd 75.0 68.0 7,369 -No. People 8 0.0 0 0.0 0.0 Return Reheat 572 -437 ~ Htg % OA 5.9 Fn MtrTD 0.0 0.0 0.0 0.0 Exhaust Humidif 0.0 0 2.06 ... Fn BldTD * 0.0 0.0 0.0 Rm Exh 100 2 0 - Htg Cfm/SqFt Opt Vent 0 0.0 0.0 Fn Frict 0.0 0.0 . 0 Htg Btuh/SqFt -19.40 Auxil -69.8 Total

Keiler & Gannon

CONIFORMION SHEET	Engineers-Architects
COMPUTED BY PUB ECO# 1-3	PROJECTY 2-4-23-10
CHECKED BY SALT	PROJECT 12-4-03-10
DATE MARCH 1973 IHSWATTE FOTERIOR VAUS REV. 19 FIRE OF THE CONTROL OF THE CONTRO	SHEET NO. S OF 14 SHEETS
REV	OF THE OFFICE OF
-	
ITLIM 252	
_ COOLING	
RASE LIHE 57,922	
ECO" A-2_ 39,119 1880	3 BTUIT/1000 SF
= 13.3	DTUH /SF
ASSUME TER: 10	
= 13.8/2 = 1.88	w/SF
= HEATITY	
TSASE LIITE 28447 BRUIT	(
FCD A-3. 15916	12,531/1000
- BLD9 177	- 12,5 BTUH/SF
BAGELINE 131220	
Eco A-3 126520- 4700	220 11/22 20 15-
	BICH SF
ASSUME EEF- 10	
AWATTS:1.3/ = .13 W/SF	
HEATING:	
275 Little 71,711	. 7
FCO"A-3 57,258 14,	
= 4	BIZUH SF
	- · · · · · · · · · · · · · · · · · · ·

				Date Prepared		Sheet & Of	
CONSTRUCTION COST E	STIMAT	Ε		February	1993	51.00 × 51	14
Project			:	Project No.	Basis for	Estimate	
EEAP Limited Energy Study							
Location				<u> </u>	Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect					1		•
Keller & Gannon							
Drawing No.		Estimeto	ж	· · · · · · · · · · · · · · · · · · ·	Checked	Ву	
ECO# A-3 Insulate Exterior Walls							
Line Item	No.	untity Unit	Per	Labor	Per	Asterial	Total
	Units	Meas.	Unit	Total	Unit	Total	Cost
Building 177				244.772		12.22	
1" Polysterene Rigid Insulation	2600		\$5	\$11,700	\$3	\$8,294	\$19,994
Stucco Covering	2600	SF	\$5	\$13,000	\$4	\$9,360	\$22,360
Sub Total (Building 177)							\$42,354
Duilding 050							
Building 252	1400	SE.	- e	\$6,000	60	\$4.466	640 700
1" Polysterene Rigid Insulation			\$5	\$6,300	\$3	\$4,466	\$10,766
Stucco Covering	1400	<u>эг</u>	\$5	\$7,000	\$4	\$5,040	\$12,040
Sub Total (Building 252)	_						\$22,806
							·
				-			

			\$221		\$410	\$437	\$214			\$288	\$286	\$286	\$288	\$286	\$286	\$286							ľ	Γ	Γ		Ī	ľ		\$938	Γ		
		Total				L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	Fuel Oil	\$/YR	0\$		\$0	0\$	0\$			0\$	9	0\$	\$	2	3	\$														\$436			33,3
Savings	Propane	\$/YR	\$158		\$294	\$307	\$157			\$184	\$184	\$194	\$184	\$104	\$184	\$184														2			25.00
	Electric	\$/YR	\$63		\$116	\$130	\$28			\$85	203	\$85	\$85	\$85	\$85	\$85														\$503			
	Fuel Oil	MBTU/Yr	0.0		0.0	0.0	0.0			0.0	0.0	0.0	0.0	00	0.0	0.0														87.6			3
Savings	Propare	MBTU/Yr	20.1		37.4	39.0	10.0			24.7	24.7	24.7	24.7	24.7	24.7	24.7														0.0			33,5
	Electric	Kwh/Yr	848		1,554	1,747	775			1,234	1,234	1,234	1,234	1,234	1,234	1,234														6,745			300
	Fuel Oil	MBTU/Yr	•		•										 -															631.4			
W/ECO-A4	Propane	MBTU/Yr	23.9		145.8	154.1	17.4			46.3	46.3	46.3	46.3	46.3	46.3	46.3																	
Energy Use W/ECO-A4	Electric	Kwh/Yr	4,972		11,148	1,036	4,490			2,638	2,638	2,638	2,636	2,638	2,638	2,638														20,340			
	Fuel Oil	MBTU/Yr																	3944.7	1375	1375	1375	1375							918			
Use W/Previous ECO's	Properse	MBTU/Yr	44	768.5	183.2	193.1	37.3	52.5		71	71	71	71	7	1,	7.1	6.1	83.8						38.2	153	38.2	38.2	38.2	38.2		38.2	1040	
Energy Use	Electric	Kwh/Yr	5,818	15,216	12,702	2,783	5,265	418	823	3,872	3,872	3,872	3,872	3,872	3,872	3,872	10,869	12,405	108,696	268,495		286,764	276,379	18,805	162,971	18,805	18,805	18,805	18,805	27,085	18,805	629,841	
Heating	Efficiency		80.0%	86.0%	65.0%	64.0%	61.0%	80.78	¥	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	66.4%	65.0%	70.8%	71.4%	72.1%	71.9%	71.2%	82.0%	66.6%	80.78	67.0%	80.78	80.79	73.0%	80.79	58.7%	
Cooling	Degree	Hours	21,833	21,833	21,833	21,833	21,833	21,833	9,003	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	19,953	21,833	21,833	21,833	21,833	21,833	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	21,833	
Heating	Degree	Hours	93,192	85,120	93,192	65,120	93,192	93,192	11,702	60,531	60,531	60,531	60,531	60,531	60,531	60,531	60,531	74,412	116,562	85,120	85,120	85,120	85,120	60,531	60,531	60,531	60,531	60,531	60,531	39,863	60,531	85,120	
Area	(SF)		1,090	9,120	2,001	2,250	866	7,172	2,025	2,250	2,250	2,250	2,250	2,250	2,250	2,250	3,599	3,599	16,768	27,238	26,999	26,692	36,063	3,000	10,000	3,000	3,000	3,000	3,000	12,299	3,000	41,002	
Bldg			8	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	208	207	208	220	230	240	241	243	244	246	247	252	286	295	

	Fuel Oil	8/YR S/YR Total		\$0 \$327	-	50 50				\$0 \$0 \$57	\$0 \$0 \$57	\$0 \$0	08 08	H	08	08 08	80 80 873	\$118 00 \$118		8	90 90 80	8	08		8	80 80 878	08	08 08	08 08			2
Savings	-	\$WR	1	\$327		1881				123	192	123	157	153	\$57	157	873	\$118	0098	8075	8967	958	\$1,291	876	500	878	2.8	28	9.9		878	2
ũ	<u> </u>	MBTU/Yr	1	0		0				0	0	0	0	0		0	0	0	0	•	0	0	0	0	0	0	0	0	0		0	1
	Properte F	MBTU/Yr M		0	_	0				0	•	0	٥	0	٥	0	0	0	0	0	0	0	0	0	0	0	•		0		0	
Savings	⊢	Kwh/Yr N		4,381		1,081				763	ş	Ę	82	8	£	æ	98 68	1,580	8,054	13,083	12,968	12,821	17,322	1,018	848	1,018	1,018	1,016	1,016		1,018	
	Fuel Oil	MBTU/Yr																														
W/ECO-AS	Properie	MBTU/Yr																			-											
Energy Use W/ECO-AS	Electric	Kwh/Yr		10,835		1,702				3,100	3,100	3,100	3,100	3,100	3,100	3,100	9,648	10,825	100,642	255,412	265,627	273,043	250,057	187,71	162,123	187,71	17,787	17,787	17,787		17,787	
		Total															\$27													\$732		
	Fuel Oil	8/YR															æ													9674		
	Propene	\$YR															8													8		
Savings	Electric	B/VR															818													9023		
	Fee Q																													8		
	Properse	WBTU/Yr															-													ŀ		
Savinge	Electric	Kwh/Yr															92													3,962		
3	FLEICH	MBTU/Yr																												75		
Frency Use W/ECO-A3	Propere	MBTU/Yr															8.8															
Foerov Us	Electric	Kwh/Yr															10.620													16.378		
Pide				28	124	127	2	3	3	ē	- 62	8	3	2	8	167	111	178	8	20	Š	823	82	240	24	3	72	32	72	282	ž	3

		_		, -	_				,	_	,		,											-				,				_	
		Total		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56		
	Fuel Oil	\$/YR		\$0		\$0				\$0	\$0	\$0	\$0	\$0	\$0	\$0	0\$	\$0						\$0	\$0	0\$	\$0	05	\$0		\$0		0
	Propane	\$/YR		\$0		0\$				\$0	0\$	0\$	0\$	0\$	%	S S	0\$	Ş						0\$	Ş	\$	0\$	Ş	S		\$0		0
Savings	Electric	\$/YR		\$242		09\$				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56		\$1,138
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0,0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
Savings	Electric	Kwh/Yr		3,252		802				267	287	287	287	287	267	287	906	1,173						756	630	756	756	756	756		756		15,264
	Fuel Oil	MBTU/Yr																															
W/ECO-A7	Propane	MBTU/Yr																															
Energy Use \	Electric	Kwh/Yr		7,583		006				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	161,493	17,032	17,032	17,032	17,032		17,032		
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	208	207	208	229	230	240	241	243	244	246	247	252	286	295	

ECO-A3 COST SAVINGS

Building	Construction Cost	O&M/YR	Total	Sales Tax	OH & P	Bond	Contingenc	Savings	SIR
171	\$42,354	\$0	\$42,354	\$45,742	\$59,465	\$60,060	\$66,066	\$259	0.0
252	\$22,806	\$	\$22,806	\$24,630	\$32,020	\$32,340	\$35,574	\$7,194	0.2

Construction Cost....Installed Cost

O&M/YR.....Yearly maintenance

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30%

Bond.......Estimators contingency 10%

Savings......Yearly savings multiplied by UPW factor for 20 years (13.59)

SIR.....Savings/(Cost+Maint*UPW)

Life Cycle Cost Analysis Summary ECO A-3 Energy Conservation Investment Program (ECIP) Sheet H of 14

	Fort Hunter Lig Insulate Exterior tion Name: ECO#		Region No. 4			Project No. Fiscal Year	
	e: March 1993	- A-0	Economic Life:	20	YEARS	Preparer: K	ELLER & GANNON
1. investmen	t Costs						
A. Constructi			\$104,180	-			
B. SIOH	011 00363		\$5,730	-			
C. Design Co	ost		\$6,251	-			
•	t (1A+1B+1C)		\$116,161	-			
	alue of Existing E	auipment	Vy				
_	ity Company Reb	• •				_	
	stment (1D-1E-1F					\$116,1	61
2. Energy Sa	vings (+)/Cost(-)	:					
Date of NIST	IR 85-3273-X Use	d for Discount Facto	ors.	_			
Energy	Cost	Saving	Annual \$		Discount	Discounted	i
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$21.84	14.0	\$305		14.53	\$4,43	6
B. Dist	\$4.98	47	\$234		17.63	\$4,12	
C. Propane	\$7.87	11	\$8 -		18.59	. \$146	3
D. Other	·		_				
E. Demand S F. Total	avings		\$547	-		\$8,70	9
3. Non Energ	y Savings (+) or	Cost (-):					
A. Annual Re	curring (+/-)	-	\$0 -				
	Factor (Table A)			-	13.59		
	d Savings/Cost ((3A x 3A1)				\$0	:
B. Non Recui	rring Savings (+)	or Cost (-)					
item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Sav- ings(+)Cost(-)(4)		
a.							
b.			_				
c.			_	_			
d. Total				-			
C Total Non I	Energy Discounte	ed Savings (3A2+3B	d4)		\$0		
4. Simple Pay	/back 1G/(2F3+3	3A+(3Bd1/Economic	: Life)):		212.3	Years	
	Discounted Saving				\$8,709		
	Investment Ratio				0.07		
7. Adjusted In	nternal Rate of Re	eturn (AIRR):			-16.38%		

Keiler & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO A4	PROJECT 16 - 403 - 10
CHECKED BY	INSULATE CELLINGS/	
DATE HARCH 19 73	_	SUSSET NO 1 OF 11 SUSSETS
REV19	ROOFS	SHEET NO OF SHEETS

DESCRIPTION F METTON

BUILDING LINCH CURRENTLY PO HOT HAVE CEILING HESULATION.

FACILITIES INCLUDED

7000 6 X

101 - ECO HOT ETCO. ENTOPED DUE TO MISTERIAL HATCHE

124X

1274

131 4

144-ELD IN PRESIMENDED DUE TO BUILDING USE

15 6-ECO HST EECTIMENDED DUE TO ECHANNY FUNCTION

161 =

162 ×

252*

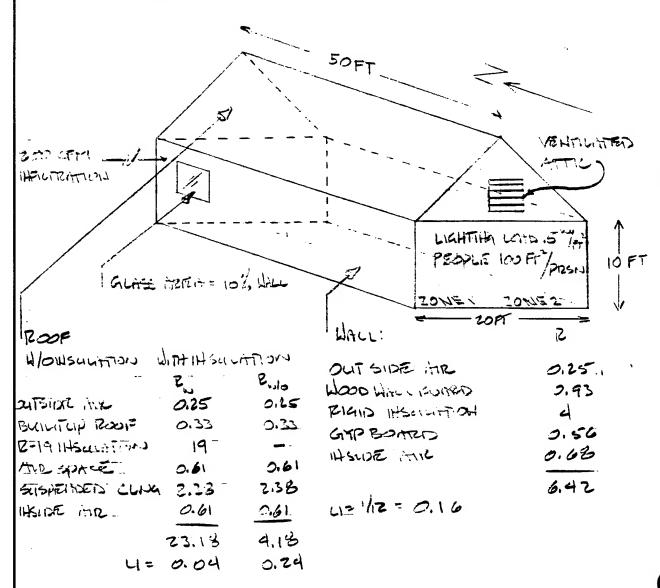
TRACE GOO MAILTUS.

Keller & Gannon

Engineers-Architects

COMPUTED BY PJ?	T-1 0 A - M	PROJECT 1/2-403-10
CHECKED BY	11)2 - 5 154 Wis 17 m=5	
DATE 11TECH 19-13	HSULME CEILINGS LOOFS	
REV 19	PER DO MARL TELLEN	SHEET NO. 2 OF 11 SHEETS

THE FULLOWING BUILDING LAS MUDEUM FOR A PERRESENTINE TENTE SOD ATTICKT SIS



SCO ACT V 600 PAGE 3

PHOELIHE

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

*****	*****		MITTER COTT	PEAK ****	****	****	***	**** CLG S	PACE	PEAK ****	HEV	TING COL	L PEAK	
Peaked at		((Mo/Hr:				*	Mo/H	lr: 7,	/18 *		Mo/Hr:	13/ 1	
Outside Ai		OAT		96/ 70/ 70.0	ı		*	OAD	B: 9	1 *		OADB:	. 2 7	
outside Ai	1>	Uru.	/0/ WD/ IIK.	,0, .0, .00			*			*				
		Space	Dot Air	Ret. Air	Net	Percnt	*	Spe	ce	Percnt *	Space Pe	ak Coi	l Peak	Percnt
	Cou	space	Sensible		Total	Of Tot	*	Sensib	ole	Of Tot *	Space Se	ns To	t Sens	Of Tot
Envelope L		(Btuh)	(Btuh)		(Stuh)	(%)	*	(Btu	h)	(%) *	(Btu	h)	(Btuh)	(%)
•		0	0		0	0.00	*		0	0.00 *		0	0	0.00
Skylite		0	0		0	0.00			0	0.00 *		0	0	0.00
Skylite Roof Con		٥	14,919		14,919	21.75			0	0.00 *		0	-7,898	22 .93
Glass So		15,120	0		15,120	22.04	*	16,9	40	35.17 *		0	0	0.00
Glass Co		2,421	0		2,421	3.53	*	2,0	002	4.16 *	-6,2	91	-6,291	18.27
Wall Cor		23,987	6,143		30,130	43.92	*	24,1	108	50 .05 *	-16,4	74 -	20,252	58.80
Partitio		0	0,142	•	0	0.00	*		0	0.00 *		0	0	0.00
Exposed		0			0	0.00			0	0.00 *		0	0	0.00
,		0			0	0.00			0	0.00 *		0	0	0.00
Infiltra		_	21,062	,	62,590	91.24		43,0)50	89.37 *	-22,7	'65 ·	34,440	100.00
Sub Tota		41,528	21,002	•	,		*	•		*				
Internal L	.oags	4 707	0	,	1,707	2.49	*	1,7	707	3.54 *		0	0	0.00
Lights		1,707		,	4,300	6.27		1,8		3.74 *		0	0	0.00
People		4,300		0	0,500	0.00		•	0	0.00 *		0	0	0.00
Misc		0	0		6,007	8.76		3,5	506	7.28 *		0	0	0.00
Sub Tota		6,007	0	_	0,007	0.00		1,6		3.35 *	-1,1	09	0	0.00
Ceiling Lo		1,961	-1,961		0	0.00		.,-	٥	0.00 *		0	0	0.00
Outside Ai		0	C) 0	0	0.00			•	0.00 *		_	0	0.00
Sup. fan h	leat		_	_	0	0.00				0.00 *			0	0.00
Ret. Fan H	leat		C		-	0.00				0.00 *			0	0.00
Duct Heat	•		C)	0	0.00			0	0.00 *		0	0	0.00
OV/UNDR Si	izing	0		_	0	0.00			v	0.00 *		•	0	0.00
Exhaust He	eat		C		0	0.00				0.00			0	0.00
Terminal E	Bypass		C) 0	0	0.00	*			*				
			40.400	0	68,596	100.00	*	48,1	170	100.00 *	-23,8	73	-34,440	100.00
Grand Tota) (==>	49,496	19,100	, ,	00,390	100.00		٠,٠,٠			•			
				OLING COIL SE	LECTION							ARE	\ s	
	Total C	apacity	Sens Cap.			ng DB/WB	/HR	Leavi	ing DB	/WB/HR	Gross Tot		Glass (s	f) (%)
	(Tons)	(Hbh)	(Mbh)	(cfm)	Deg F De	f Gra	ins	Deg F D	eg F	Grains	Floor	1,000		
Main Clg	5.7	68.6	66.1	3,219	81.1 6	4.5 6	6.9	61.2	57.5	67 .2	Part	0		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	1,000		0 0
Totals	5.7	68 .6									Wall	1,400		140 - 10
, , , , ,														
	HEATING	COIL SEL	ECTION		AI	RFLOWS (cfm)			NGINEERING				S (F)
	Capacity				Type →	Cooling	1	Heating	_	% OA	0.0			: Htg -
	(Mbh)	(cf		F Deg F	Vent	0	1	0	Clg	Cfm/Sqft	3.22	SADB	61.	
Main Htg	-50.6		219 60.3	·	Infil	0)	0	Clg	Cfm/Ton	563.16		m = 81.	
Aux Htg	0.0	-	0 0.0		Supply	3,219)	3,219	Clg	sqft/Ton	174.94	Retur		
Preheat	-1.5		219 60.1		Hincfm	Ċ)	0	Clg	Btuh/Sqf1	68.60	Ret/Q		
					Return	3,219	,	3,219	No.	People	10	Runar	nd 75.	0 68.0
	0.0	1		0.0				-,,						
Rehest	0.0		0 0.0					0		X OA	0.0	Fn Mt	rTD 0.	0.0
Reheat Humidif Opt Vent	0.0 0.0	1	0 0.0	0.0	Exhaust Rm Exh)		Htg		0.0 3.22	Fn Mt Fn Bl		

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ECO" A-4

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

V 600 PAGE 5

- PACKAGED TERMINAL AIR COND. System Peak PTAC Peaked at Time ==> Mo/Hr: 7/18 Mo/Hr: 7/18 Mo/Hr: 13/ 1 Outside Air ==> OADB/WB/HR: 91/ 68/ 70.0 OADB: 91 OADB: 27 Space Ret. Air Ret. Air Net - Percnt * Space Percnt * Space Peak Coil Peak Percent Total Of Tot * Sensible Of Tot * Sens.+Lat. Sensible Latent Space Sens Tot Sens Of Tot (Btuh) (%) * Envelope Loads (Btuh) (Btuh) (%) (Btuh) (Btuh) (Rtub) (Rtub) (%) 0.00 * 0 0.00 * Skylite Solr 0 0 Ω 0 0.00 0 0 0.00 * 0.00 * Skylite Cond 0 n 0 0 0 0.00 3.92 * 0 0.00 * Roof Cond 0 2.272 0 -1.468 5.16 2,272 29.25 * 18.550 39.05 * Glass Solar 16,940 0 16.940 0 0 0.00 -6,291 Glass Cond 2,002 3.46 * 1.523 3.21 * 2,002 0 -6,291 22.11 Wall Cond 23,224 48.89 * 53.01 * 24,108 6,594 30,702 -16,474 -20,688 72.72 0.00 * Partition 0 0 0.00 * 0 ٥ 0 0.00 Exposed Floor 0 0 0.00 * 0 0.00 * 0 0 0.00 0.00 * 0 0.00 * Infiltration Λ ٥ O 0 0.00 Sub Total ==> 43.050 8.865 51.915 89.63 * 43,297 91.14 * -22,765 -28.447 100-00 Internal Loads Lights 1.707 1,707 2.95 * 1.707 3.59 * 0 0 0 0.00 4,300 7.42 * 1,800 3.79 * 0 People 4.300 0 0.00 Misc 0.00 * 0 0.00 * 0 0 0 0 ٥ 0.00 0 Sub Total ==> 3,506 7.38 * 0 6.007 10.37 Ω Û 6.007 Ω 0.00 Ceiling Load 812 0.00 * 704 --1.48 * -515 O n -812 0.00 0.00 + Outside Air n 0.00 * ٥ 0 n n Λ 0 0.00 0.00 * Sup. Fan Heat 0 0.00 * n -0.00 0.00 * 0.00 * Ret. Fan Heat ß Ð ٥ 0.00 0.00 * Ω 0.00 * Duct Heat Pkup 0 n 0.00 0.00 * 0.00 * OV/UNDR Sizing 0 ٥ 0 0.00 Exhaust Heat 0 0.00 * 0.00 * 0.00 Terminal Bypass 0.00 * 0.00 * 0.00 57,922 100.00 * 47,507 100.00 * Grand Total ==> 49,868 8.054 -23,280 -28,447 100.00 -----COOLING COIL SELECTION-----------APFAS-----Gross Total Glass (sf) (%) T Total Capacity Sens Cap. Coil Airfi Entering DB/WB/HR Leaving DB/WB/HR Deg F Deg F Grains Deg F Deg F Grains (Tons) (Hbh) (Mbh) (cfm) Floor 1.000 : Hain Cla 4.8 57.9 55.4 3,170 77.5 63.3 66.9 61.2 57.3 66.0 Part 0 Aux Clg 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 ExFlr 0 0.0 .. 0.0 . 0.0 Opt Vent 0.0 0.0 ... 0.0 Ω 0.0 0.0 0.0 Roof · 1,000 -0 % 0 Totals 4.8 Uall 1,400 3 140 = 10 = ------HEATING COIL SELECTION----------AIRFLOWS (cfm)------- ENGINEERING CHECKS----TEMPERATURES (F)---Capacity Coil Airfl Ent - Lyg : Туре⊲≃ Cooling Heating Cla X OA -0.0 ~ Type Clg at Htgma (Hbh) 0 ٥ Clg Cfm/Sqft 3.17 SADB # 61.2 _ 74.8 : (cfm) Deg F Deg F Vent " Main Htg -37.2 3,170 63.9 74.8 Infil 0 0 Clg Cfm/Ton 656.65 Plenum = 77.6 63.7 Aux Htg 0.0 0 0.0 0.0 Supply 3,170 3,170 Clg Sqft/Ton 207.18 Return - 77.5 Preheat -0.0 3,170 64.2 61.2 Minefe . 0 -0 Clg Stuh/Saft 57.92 Ret/OA = 77.5 3,170 Reheat 0.0 3.170 10 : Runernd 75.0 0 0.0 - 0.0 Return No. People 68.0 **Humidif** Fn MtrTD 0.0 0.0 ٥ 0.0 0 Ω Htg % CA 0.0 0.0 Exhaust 0.0 ..: Opt Vent 0.0 0 Fn BldTD 0.0 n 0.0 Λ Htg Cfm/SqFt 3.17 0.0 Rm Exh 0.0 Total -37.2 Auxil 0 Htg Stuh/SqFt -37.22 Fn Frict 0.0

- 3.3

Σ	Keller	&	Gannon

	oom on work or a	Cigineers-Architects
COMPUTED BY 7.13	ECOF A =4	PROJECT_16-403-10 The FEAP
COMPUTED BY 7.475 CHECKED BY 7.475		FIL FEAR
DATE IMMECH 1913 ILE	WHITE CELLINGS/ ROOFS	SHEET NO. 5 OF 11 SHEETS
REV19	EHOLAT CITUMLATIONS	SHEET NO. 5 OF 11 SHEETS
-		
- COOLINA:		
BASELINE	68596	
		1
ELO" A-4	57,922 10,6749	57UH /1000 SF
-	•	
	= 10,67 BT	UHISP
A	E EFR = 10	
US11+0	REER BILLY JUT	
-	WATTS IN	
- WATE	S = BTU BTU :	- Ist
	10.	10
	= 1.067 W/SF	
		••
- HEATWA:		
	Taldida PTUL	
= BASFLUNE	34440 BTUH	
	28447 BTUH	5993 BTUH/1000 S
	• • •	

SHEFT 3 OF 11

Heating	Cooling	Heating	Energy Use	Use W/Previous ECO's	П	Energy Use	Energy Use W/ECO-A4			Savings			Savings		
Ž	Degree	Efficiency	Electric	Propare	FLE OF	Electric	Propere	Fuel Oil	Electric	Propare	Fuel Oil	Electric	Propane	Fuel Oil	
윈	Hours		Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$/YR	\$/YR	\$/YR	Total
21,833	833	86.0%	5,818	77		4,972	23.9		846	20.1	0.0	\$63	\$158	9	\$221
21	21,833	%0.9 9	15,216	768.5											
2	21,833	82.0%	12,702	183.2		11,148	145.8		1,554	37.4	0.0	\$116	\$284	\$0	\$410
~	21,833	64.0%	2,783	193.1		1,036	154.1		1,747	39.0	0.0	\$130	\$307	0\$	\$437
	21,833	81.0%	5,265	37.3		4,490	17.4		775	19.9	0.0	\$58	\$157	0\$	\$214
	21,833	%0.78	410	52.5											
L	9,003	ž	823												
1	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$194	9	\$286
	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$92	\$194	2	\$288
	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$194	O \$	\$286
	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$92	\$184	9	\$288
	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$92	\$194	\$	\$286
	15,420	72.0%	3,872	11		2,638	46.3		1,234	24.7	0.0	\$92	\$184	0\$	\$286
	15,420	72.0%	3,872	71		2,638	46.3	ļ .	1,234	24.7	0.0	\$92	\$184	9	\$288
	15,420	66.4%	10,860	6.1											
	19,953	88.0%	12,405	63.8											
	21,833	70.8%	108,696		3944.7										
	21,833	71.4%	268,495		1375										
	21,833	72.1%			1375										
	21,633	71.0%	286,764		1375										
	21,833	71.2%	276,379		1375										
	15,420	67.0%	18,805	38.2											
	15,420	89.99	162,971	163											
	15,420	67.0%	18,805	38.2											
	15,420	80.79	18,805	36.2											
	15,420	67.0%	18,805	38.2											
	15,420	87.0%	18,805	38.2											
	15,420	73.0%	27,085		919	20,340		831.4	6,745	0.0	87.6	\$503	0\$	\$436	\$838
_	15,420	87.0%	18,805	38.2											
	21,633	58.7%	629,841	1040											
									20,308	588	88	\$1,514	\$2.275	\$436	

SHEET 70811 ECO A-d

		Total		\$327		æ				\$57	\$57	\$57	\$57	53	\$57	\$57	23	\$118	009\$	\$10.00	1908	\$956	\$1,291	878	\$63	878	878	878	\$76		\$78	\$1,468	
	=	E F		8		6				8	æ	8	8	2	Q	08	0	08	08	08	8	00	Q#	Q	0\$	90	08	08	0		9	8	٤
	Propane	#WB		8		Q				Q\$	08	2	8	0	08	08	8	8	Q	0	Q#	08	8	œ	0	8	08	08	08		0\$	08	Ş
Savings	_	₽V.		\$327		\$81				\$57	198	254	\$57	153	182	\$57	873	\$118	\$800	89.75	1964	998	162,18	\$78	863	876	878	876	878		\$78	\$1,468	- COL.
_	_	MBTU/Yr		0		0				0	0		•	•	0	0	0	0	0	0	ŀ	0	0	0	0	0	0	0	0		0	0	ľ
		MBTU/Yr		0		0				0	o		•	°		0	٥	•	0	•	°	•	•		0	0	0	•	0		0	0	ľ
Savings	Н	Kwh/Yr N		4,381	_	1,081			-	783	200	2	28	ş	283	252	8	1,580	8,054	13,083	12,968	12,821	17,322	1,018	848	1,018	1,018	1,018	1,018		1,018	19,694	
83	_	MBTU/Yr						l	-			-																					Ì
//ECO-A5		MBTU/Yr										-																					
Energy Use W/ECO-A5	_	Kwh/Yr N		10,835		1,702				3,100	3,100	3,100	3,100	3,100	3,100	3,100	9,648	10,825	100,642	256,412	255,527	273,945	259,057	17,787	162,123	17,787	17,787	17,787	17,787		17,787	610,147	
ŭ	٦	Total															253													\$732			
	_	SYR To															Q									Ī		Ī		\$436			33,0
	•	EVB EVB												_			93													Q			į
Savings	_	BVH.					\vdash	F									818													9628			ŀ
8	₹	MBTU/Yr										-			\vdash		-													88			ļ
		MBTU/Yr N					-				\vdash						-													0		-	
Savinge	-	Kwh/Yr N						_									240													3,962			
\$	_	MBTU/Yr				-		_				-				-	-	H	Н			H								744			-
//ECO-A3	Propere F	MBTU/Yr M		1	_	H	H		<u> </u>			H					9.00					H								•			
Energy Use W/ECO-A3	Electric P	Kwh/Yr M					-	-					-				10,629			-										16,378			
Blog		_	•	120	20	127	131	<u> </u>	8	5	162	8	2	28	8	167	H	178	88	202	ã	823	082	340	241	243	344	246	247	252	286	988	

		Total		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$188	\$56	\$56	\$56	\$56		\$56		
	Fuel Oil			\$0		\$0				\$0	\$0	\$0	\$0	0\$	0\$	0\$	0\$	\$0						0\$	0\$	OŞ.	0\$	Ş	\$0		\$0		0
	Propane	\$∕YR		\$		0\$				0\$	0\$	oş.	05	0\$	0\$	0\$	0\$	0\$						\$0	0\$	9	0\$	9	\$0		0\$		0
Savings	Electric	\$/YR		\$242		09\$				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$188	\$56	\$56	\$56	\$56		\$56		\$1,279
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
Savings	Electric	Kwh/Yr		3,252		802				267	567	267	267	267	267	267	906	1,173						756	2,519	756	756	756	756		756		17,153
	Fuel Oil	MBTU/Yr																															
W/ECO-A7	Propane	MBTU/Yr																															
Energy Use	Electric	Kwh/Yr		7,583		900				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	157,060	17,032	17,032	17,032	17,032		17,032		
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	206	202	208	229	230	240	241	243	244	246	247	252	286	295	

				Date Prepared		Sheet Of	11
CONSTRUCTION COST	ESTIMAT	E		February	1993		* 1
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				<u></u>	Code A	(no design compe	dari)
Location Fort Hunter Liggett Californi	2					(no design compe	
Fort Hunter-Liggett, California	<u>a</u>				1		
Keller & Gannon							
Drawing No.		Estimat	101		Checked	Ву	
ECO A-4 Insulate Ceilings/Roofs	Qu	untity	1	Labor		daterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total - Cost
Building 6							
R-19 Batt Insulation	1090	SF	\$0.24	\$262	\$0.50	\$545	\$807
Subtotal Building 6							\$807
Building 124							44 455
R-19 Batt Insulation	2000	ISF	\$0.24	\$480	\$0.50	\$1,000	\$1,480
Subtotal Building 124							\$1,480
Building 127							
R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 127							\$1,665
Building 131							
R-19 Batt Insulation	1000	SF	\$0.24	\$240	\$0.50	\$500	\$740
Subtotal Building 131							\$740
				<u> </u>			
Building 161							· · · · · · · · · · · · · · · · · · ·
R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 161							\$1,665
Building 162							
R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 162		-		1			\$1,665
Cablotta Dallaring 102							
Building 252							4
R-19 Batt Insulation	12300	SF	\$0.24	\$2,952	\$0.50	\$6,150	\$9,102
Subtotal Building 252			ļ	ļ <u></u>			\$9,102
					 	 	
						-	
			ļ <u>-</u>			-	
				 	 	 	

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_		·		,	7**	, .	_	_	_			
SIR	2.4	2.4	2.3	2.5	13.	1.5	7:	3:	5:	5.1	5:	6.0
Savings	\$3,003	\$5,571	\$5,938	\$2,908	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$12,761
Contingenc	\$1,259	\$2,309	\$2,597	\$1,154	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$14,198
Bond	\$1,144	\$2,099	\$2,361	\$1,049	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$12,907
OH & P	\$1,133	\$2,078	\$2,338	\$1,039	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$12,779
Sales Tax	\$872	\$1,598	\$1,798	\$799	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$9,830
Total	\$807	\$1,480	\$1,665	\$740	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$9,102
O&M/YR	0 \$	\$0	\$0	O\$	Ç,	\$0	Q	\$	Ş	Ş	\$0	Ş
Construction Cost	\$807	\$1,480	\$1,665	\$740	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$9,102
Building	9	124	127	131	161	182	ක	164	165	166	167	252

ECO A-4 COST SAVINGS

Construction Cost....Installed Cost

O&M/YR......Yearly maintenance scheduled as 2.5% of installed cost

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30% Rand

Bond.....1%

Contingency......Estimators contingency 10%

Savings......Yearly savings multiplied by UPW factor for 20 years (13.59)

SIR.....Savings/(Cost+Maint*UPW)

Life Cycle Cost Analysis Summary ECO A-4 Energy Conservation Investment Program (ECIP) Sheet ● of 11

Location:	Fort Hunter Lig	gett, California	Region No. 4			Project No.	
Project Title:	Insulate Ceilings	/Roofs				Fiscal Year	FY96
Discrete Por	tion Name: ECO#	≠ A-4				_	
Analysis Dat	te: March 1993		Economic Life:	20	YEARS	Preparer: K	ELLER & GANNON
1. Investmer	nt Costs			_			
A. Construct	tion Costs		\$25,498	_			
B. SIOH			\$1,402	_			
C. Design C	ost		\$1,530	_			
D. Total Cos	t (1A+1B+1C)		\$28,430	_			
E. Salvage \	alue of Existing E	quipment				_	
F. Public Uti	lity Company Reb	ate					_
G. Total inve	estment (1D-1E-1F	7)				\$28,43	0
	avings (+)/Cost(-)			_			
Date of NIST	TIR 85-3273-X Use	d for Discount Facto	ors .				
Energy	Cost	Saving	Annuai \$		Discount	Discounted	1
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$21.84	69.0	\$1,507		14.53	\$21,89	
B. Dist	\$4.98	88	\$438		17.63	\$7,72	
C. Propane	\$7.87	289	\$2,274		18.59	\$42,28	2
D. Other	***************************************		_				
E. Demand	Savings			-			-
F. Total			\$4,220			\$71,90	14
3. Non Ener	gy Savings (+) or	Cost (-):					
A. Annual Re	ecurring (+/-)		\$0	-			
(1) Discount	Factor (Table A)				13.59		
(2) Discount	ed Savings/Cost ((3A x 3A1)				\$0 :	
B. Non Recu	ırring Savings (+)	or Cost (-)					
ite m	Savings(+)	Year of	Discount		Doscounted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
a.			_				
b. .			-				
c.				-			
d. Total							
C Total Non	Energy Discounte	ed Savings (3A2+3E	d4)		\$0 =		
4. Simple Pa	vback 1G/(2F3+3	3A+(3Bd1/Economic	: Life)):		6.7	Years	
	Discounted Saving		-11		\$71,904		
	Investment Ratio				2,53		
7. Adimes	eternal Date of Da	•			13 70%		

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY RUTS	_F=0+A5	PROJECT 16-403-10
DATE MAZZE 1913	THE TITLE SOUTH FILM	
REV 19	PENECT ESCENTION	SHEET NO OF SHEETS

TRECEPTION FICTORY.

A SOLINE FILM LIVE BE APPLIED TO THE LIMITION OF THE PULLDINAS SELECTED.

THIS FILM LIVE HAZENCE THE LIMITIONS

REFLICIONTY ITAL THIS DECREETED THE

OVER THE PARAMETER THE SUIT.

THROUGH THE HIMPOH DUE TO THE SUIT.

THIS, INTURH, ILIU DECREETER THE

COUNA LOAD CIT THE TECHNOLOGY SAVING.

FLEEPLICAL USE OF THE MC PERCUIPMENT.

FACILIDES IHVOLVED

20%

TICCLIFIC	117000	
BUD4 120	229	
127	230	
161	240	
162	241	
177	295	
178		
206		
207		

FORM 101-1/8

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY 213 CHECKED BY 3117	1 -	10 A-6		PROJECT 1/2-C	103.10
DATE REV.		PARE SOO	ALLAN XSIS	SHEET NO.	OF SHEETS
	C071140	BUILDIH	n LAS MODI		
			50FT		
			*		CATHURHA
HACTEATION					TTIC
GLASS	DECE + = 10	% TALL	PE	Attith Land.	PRSN TO FT
ROF			HACE:	- 20NS	2-1
H/OWSHUTTON L	Jintinsui	ATION	LOOD HALL BUR		0.25.
BUILTUP ROOF	0.33	0.33	PIGID IHSCLUTT	JOH	4-
Me space	.19=	0.61	GYP BOARD		0.56
SUSPERIOUS CLUB		2.38	U= 1/2 = 0,1	6	6.42
	23.18	4.18			
<u> </u>	0.04	0.24			
					•

V 600 PAGE 7

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

- PACKAGED TERMINAL AIR COMD. PTAC System 1 Peak Mo/Hr: 13/ 1 Mo/Hr: 7/18 Mo/Hr: 7/18 Peaked at Time ==> OAD8: 91 OAD8: '27 Outside Air ==> QADB/WB/HR: 91/ 68/ 70.0 Percnt * Space Peak Coil Peak Percent Net Percnt * Space Ret. Air Ret. Air Space Of Tot * Space Sens Tot Sens Of Tot Total Of Tot * Sensible Sensible Latent Sens.+Lat. (%) * (Btuh) (X) * (Btuh) (X): (Btuh) (Btuh) (Btuh) (Btuh) Envelope Loads (Rtuh) 0.00 * 0 0 0.00 * 0 0.00 0 ٥ Skylite Solr 0 0.00 * ۵ 0.00 0 0 0 0.00 * 0 0 Skylite Cond 0.00 * Δ -1,508 9.47 5.01 * 0 1,958 1,958 0 Roof Cond 56.57 * 18,550 47.42 * 18,550 ٥ 0 0.00 18.550 0 Glass Solar 4.64 * -6,291 -6,291 39.53 3.89 * 1,523 1,523 0 1.523 Glass Cond 26.44 * -6,429 -8,117 8.671 51.00 11,081 28.33 * 8.671 2.410 Wall Cond 0 0.00 * 0 0.00 0.00 * Ω 0 Partition 0.00 * 0.00 * 0 0 ٥ 0.00 n Exposed Floor 0 0.00 * ٥ 0.00 * ۵ ٥ 0.00 O Infiltration -12,720 -15,916 28,744 87.66 * 100.00 33,112 84.65 * 4,369 28,744 Sub Total ==> Internal Loads 0 0.00 4.36 . 1.707 5.20 * 1,707 1.707 Lights 4,300 10.99 * 1,800 5.49 * 0 0 0.00 4,300 People 0 0.00 0 0.00 * 0 0.00 -* ٥ 0 Hisc 3,506 0 0.00 4 10.69 * 6,007 15.35 * 6,007 ٥ Sub Total==> 1.65 * -418 0.00 540 -0 - 0.00 * 474 -474 .. Ceiling Load 0.00 * 0 0 . 0.00 0 . 0.00 .* 0 n ٥ Outside Air 0 0.00 0.00 * 0 . 0.00 * Sup. Fan Heat ۵ 0.00 0.00 * 0.00 * 0 Ret. Fan Heat n 0.00 0.00 * 0.00 * 0 Duct Heat Pkup 0 0.00 0.00 * 0 -0.00 * ٥ OV/UNDR Sizing 0 0.00 0.00 * 0.00 * 0 0 0 Exhaust Heat 0.00 * 0.00 0.00 * ۵ ٥ 0 Terminal Sypass -15,916 100.00 32,790 100.00 * -13,138 39,119 100.00 * 3,894 35,225 Grand Total ==> -----AREAS-----------COOLING COIL SELECTION-----Gross Total Glass-(sf) (X) = Entering DB/WB/HR Leaving DB/WB/HR Total Capacity Sens Cap. Coil Airfl Deg F Deg F Grains Deg F Deg F Grains Floor. 1,000 = (cfm) (Mbh) (Mbh.) (Tons) 0 * 66.9. 60.3 56.6 64.8 Part. 2.064- 76.5 62.9 30.1 36.6 . Main Clg 3.3 0.0... 0.0 0.0 . 0.0 0 7 ExFlr 0.0 0.0 0.0 0.0 : Aux Clg 0.0 0.0 0.0 2 0.0 2 0.0 2 0.0 1,000 🖘 0 0 0 Roof -0.0 0.0 . 0.0 0.0 Opt Vent 1,400-1404 10 × **Vall** 39.1 1.1 -Totals -- TEMPERATURES (F)----- ENGINEERING CHECKS-------AIRFLOWS (cfm)-----0.0 Type= Cig & Htg = Type - Cooling Heating Clg % CA Capacity Coil Airfl Ent LVG # 2.06 .. SADE# 60.3... 73.9 0 > Clg Cfm/Sqft Deg F Deg F Vent-0 😘 (Hbh) (cfm) 633.22 Plenum == 76.5 7 64.7 0 - Clg Cfm/Ton 0 --20.5 2,064 64.7 73.9 Infil **Hain Htg** 306.76 Return - 76.5 65.0 2,064 - Clg Sqft/Ton Supply 2,064 > 0 0.0 0.0 Aux Htg 0.0 Ret/OA ≥ 76.5 - 65.0 39.12 0 🗵 Clg Stuh/Sqft 0 :: 2,064 - 65.0 60.3 Minefm --0.0 Preheat 10 * Runernd * 75.0 5 68.0 2,064 - No. People 2.064 ---0.0 0.0 Return Reheat 0.0 Fn MtrTD ™ 0.0 & 0.0 .. 0 -0 F Htg % CA 0.0 0.0.0. Exhaust Humidif 0.0 2.06 - Fn BldTD " 0.0 0.0 0 🧇 0 - Htg Cfm/SqFt 0.0 0.0 Rm Exh 0.0 Opt Vent 0 Htg Stuh/SqFt -20.52 Fn-frict = 0.0 = 0.0 0 : Auxil -20.5 Total

ECO# A-4 ECO# A-3 ECO# A-5

SHEFT GOF 13

V 600 PAGE 3

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

Total

-18.3

PACKAGED TERMINAL AIR COND. Peak PTAC ***************** CLG SPACE PEAK ********* HEATING COIL PEAK ******** ****** COOLING COIL PEAK ***** Mo/Hr: 7/17 Mo/Hr: 13/ 1 Peaked at Time ==> Mo/Hr: 7/17 Outside Air ==> QADE: 96 **OADS: 27** OADB/WB/HR: 96/ 70/ 70.0 Net Percnt * Space Percnt * Space Peak | Coil Peak | Percnt Space Ret. Air Ret. Air Total Of Tot * Sensible Of Tot * Sens.+Lat. Sensible Latent Space Sens Tot Sens Of Tot (%) * (Btuh) (Btuh) (Btuh) (%) Envelope Loads (Btuh) (Btuh) (Btuh) (Btuh) (%) * 0.00 * ٥ 0 0.00 Skylite Solr 0 0 0 0.00 * 0 Skylite Cond 0 0 0.00 * 0 0.00 * 0 0 0.00 0 0.00 * Roof Cond 1,944 5.97 * 0 0 -1.499 10.08 0 1,944 37.63 * 46.44 * 12,250 12,250 0 n 0.00 Glass Solar 12,250 0 4.87 * -5,253 Glass Cond 1,283 3.94 * 1,283 -5,253 35.35 1,283 0 32.87 * 8,671 34.00 * 8,671 -6,429 -8.107 54.56 Wall Cond 2.395 11,066 0 0.00 * 0 0.00 * ٥ Ω 0.00 Partition n 0.00 * 0.00 * Λ 0 n 0.00 Λ Exposed Floor O 0.00 * 0 0.00 * 0 ٥ 0.00 Λ Infiltration 0 26,544 81.55 * 22,205 84.17 * -11,682 -14,859 100.00 Sub Total ==> 22,205 4,340 Internal Loads 1.707 1,707 5.24 * 1.707 6.47 * 0 0 0.00. Lights 6.82 * People 4,300 4,300 13.21 * 1,800 0 0 . 0.00 0.00 * Misc Λ 0 0 0.00 * 0 0 0 . 0.00 . 18.45 * 3.506 13.29 * 0 0.00 Sub Total ==> 6.007 Λ 6,007 0.00 * 668 -2.53 * -516 0 0.00 Ceiling Load 582 -582 0 0.00 * 0 - 0.00 -Outside Air 0 0.00 * 0 0 0.00 * Sup. Fan Heat 0.00 * 0.00 0 0.00 * 0.00 * 0.00 Ret. Fan Heat 0 0 0.00 * 0 0.00 * 0.00 Duct Heat Pkup 0 0.00 * 0.00 * 0.00 OV/UNDR Sizing Ω 0.00 * 0.00 * 0.00 Exhaust Heat 0 0 0 0.00 * 0.00 Terminal Bypass 0.00 * 0 0 Λ 32,551 100.00 * 100.00 * -12,198 -14,859 100.00 26,379 Grand Total ==> 28,793 3,757 0 ------COOLING COIL SELECTION-----Gross Total Total Capacity Sens Cap.__Coil Airfi Entering DB/MB/HR Leaving DB/WB/HR Glass (sf) (%) % Deg F Deg F Grains Deg F Deg F Grains Floor 1,000 (Tons) (Mbh) (Mbh) (cfm) Main Clg 59.8 56.3 64.2 Part . 0 2.7 32.6 30.1 1,602 76.9 63.1 66.9 Aux Clg 0.0 - 0.0 - 0.0 ExFlr 0 -0.0 0.0 0.0 0 . 0.0 0.0 0.0 Opt Vent 0.0 0.0 0.0 -0 . 0.0 . 0.0 0.0 . 0.0 . 0.0 . 0.0 E Roof -1,000 -0 7 0 Wall. 1,400 ... 140 = 10 = Totals 2.7 32.6 -- ENGINEERING CHECKS---- TEMPERATURES (F)---------HEATING COIL SELECTION----------AIRFLOWS (cfm)-----0.0 ~ Type - Cooling Heating Type= Clg : Htg Capacity Coil Airfl Ent * Lvg & Clg % CA 0 ~ 0 - Clg Cfm/Sqft 1.60 - SADE = 59.8 4 75.8 ... (Mbh) Deg F Deg F (cfm) Vent ** Clg Cfm/Ton 590.46 Plenum = 76.8 = 64.5. 1,602 0 0 Main Htg -18.364.5 75.0 Infil 1,602 Clg Sqft/Ton 1,602 368.66 76.9 64.8 : Supply Return Aux Htg 0.0 0 0.0 0.0 32.55 Ret/OA = 76.9 64.8 0 f Cig Stuh/Sqft Preheat -0.0 1,602 64.8 59.8 0 .. Minefm -10 % Runernd % 75.0 68.0 1,602 -1,602 No. People 0.0 0 0.0 0.0 Return 0 0 Htg % CA 0.0 Fn MtrTD 0.0 0.0 Humidif 0.0 0.0 - 0.0 Exhaust Opt Vent 0 0.0 . 0.0 . Rm Exh : 0 - Htg Cfm/SqFt 1.60 . Fn BldTD 0.0 ... 0.0 .. 0.0

0

Auxil

Htg Stuh/SqFt -18.31

fn Frict 0.0 " 0.0

Keller & Gannon

Engineers-Architects

COMPUTED BY 74	=co" A-5	PROJECT 16-403-10
DATE 19 3 REV. 19	THETERY CHICKLISTING	SHEET NO. 5 OF 13 SHEETS

١١١١م ١١٥١٩

EXELIHE: 39,119

ECO* A-5 32,551 6,533 BTUH /1000 S.F. = 6,568 BTUH/S.F

ASSUME FAR = 10 A. LIMTS = 5.55% = 166 WHT/SE

SHEAT GORIS ECO A-S

\vdash	Heating	Cooling	Heating	Energy Use	Use W/Previous ECO's	Г	Energy Use	Energy Use W/ECO-A4			Savings			Savings		
ŏ	Degree	Degree	_	Electric	Properse	Fuel Oil	Electrio	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	
-	Hours	Hours		KwtyYr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$/YR	\$/YR	\$/YR	Total
9	93,192	21,833	%0.99	5,818	44		4,972	23.9	,	846	20.1	0.0	\$63	\$158	0\$	\$221
	65,120	21,833	86.0%	15,216	768.5											
. ~	93,192	21,833	65.0%	12,702	183.2		11,148	145.8		1,554	37.4	0.0	\$118	\$284	\$ 0	\$410
	85,120	21,833	\$0.29	2,783	103.1		1,036	154.1		1,747	39.0	0.0	\$130	\$307	\$ 0	\$437
_	93,102	21,833	61.0%	5,265	37.3		4,490	17.4	•	775	10.0	0.0	\$28	\$157	90	\$214
-	93,192	21,833	87.0%	418	52.5											
	11,702	800' G	ž	823												
_	60,531	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$95	\$194	\$0	\$288
-	60,531	15,420	72.0%	3,872	7		2,636	46.3		1,234	24.7	0.0	\$92	\$194	0\$	\$286
	60,531	15,420	72.0%	3,872	F		2,636	46.3		1,234	24.7	0.0	892	\$194	0\$	\$286
	60,531	15,420	72.0%	3,872	7		2,638	46.3		1,234	24.7	0.0	20\$	\$194	\$ 0	\$286
	60,531	15,420	72.0%	3,872	7		2,638	46.9		1,234	24.7	0.0	\$85	\$194	80	\$288
	60,531	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	26\$	\$194	\$ 0	\$288
	60,531	16,420	72.0%	3,872	7.		2,636	46.3		1,234	24.7	0.0	\$92	\$194	\$0	\$286
	60,531	15,420	66.4%	10,860	6.1											
	74,412	19,953		12,405	63.6											
	116,562	21,833	70.6%	108,696		3944.7										
	85,120	21,833	_	268,495		1375										
	85,120	21,833	72.1%			1375										
	85,120	21,633	71.9%	286,764		1375										
	85,120	21,833	71.2%	276,379		1375										
	185,00	15,420	%0'29	18,805	58.2											
	60,531	15,420	%9.99	162,971	163											
	60,531	15,420	%0' 29	18,805	36.2											
	60,531	15,420	%0' 29	18,805	38.2											
	60,531	15,420	%0.78	18,805	38.2											
	60,531	15,420	80.79	18,805	38.2											
	39,883	15,420	73.0%	27,085		919	20,340	•	831.4	6,745	0.0	87.6	\$503	0\$	\$436	666\$
	60,531	15,420	67.0%	18,805	38.2											
	65,120	21,833	58.7%	629,841	1040											
		•	-							20,308	289	88	\$1,514	\$2,275	\$436	

SHEET TOF 13 ELO A-S

		ote		72		ž				22	193	123	198	198	198	128	2	118	000	\$976	1981	9508	\$1,201	24	22	878	2.5	878	2		878	\$1,468		
	2	E S	1	2		8		,		8	2	8	8	8	\$0	8	8	2	8	8	2	8	2	8	8	8	8	2	2		8	8	æ	
	Propere	E.	1	2		8				2	2	8	8	8	9	Q	Q.	8	8	8	8	8	8	8	8	8	90	9	8		8	8	8	
	Bectrio	Ę		/202		ź	1			724	\$67	\$67	199	199	1657	123	23	118	8	8075	200	\$956	1,201	2	æ	23	878	878	2		23	81,468	87,772	
	20.00	MBTZ		•		9				•	0	0	0	•	0	0	0	•	۰	0	٥	0	0	•	•	۰	0	0	0		0	•	0	
	Properse	MBTU/		-		•				0	0	•	°	•	0	•	0	0	0	0	٥	0	0	0	0	0	0	0	0		0	0	0	
ORAILIAS	_	Kwh/Yr		138		18				202	202	Ę	Ę	Ę	Ę	æ	98	1,580	6,064	13,063	12,968	12,821	17,322	1,018	848	1,018	1,018	1,018	1,018		1,018	10,004	104,262	
	Fuel Oil	MBTU/Yr							П																									•
CHAIN DIE W/COOKS	Properse	MBTU/Y																																
	Electric	Kwh/Yr		535		1,702				3,100	8,100	9,100	9,100	3,100	8,18	9,100	9,648	10,626	100,642	265,412	255,527	273,943	259,057	17,787	162,123	17,787	17,787	181,71	17,787		17,787	610,147	,	
		Total															127													252.3				
	Fuel Oil	₽¥¥															8	4												\$436			\$436	
	Properse	. SYR															2													8	Ţ		8	
Sevings	Electric	E.S															Ę	ŀ												282			5363	
	Fed O											Ī	Ī			Ī	ŀ													2	Get.		8	
	Propers	METUA										Ī		Ī			-	-						Γ							-		-	
Sevings	Electric	Kuthyte															ã	-												3,962	*		4,202	
_	2	MBTU/A																												7				
W/ECO-A:	Paper	METCA									Ī			T			8	-																
Energy Use W/ECO-A3	Beoffo	K W														Ī	10.620	-												10.378	-			
Picto		7		8	ž	121	152	3	1 2	5			2 3	1	3 5	3 9	E	5	Ę	i g	8	8	1 8	ş	2	2	3	36	1 3	3	1 2	ă		•

i	-					281182			
-	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	
Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$/YR	\$/YR	\$/YR	Total
7,583			3,252	0.0	0.0	\$242	\$0	\$0	\$242
П						-			
			802	0.0	0.0	\$60	\$0	\$0	\$60
Г			567	0.0	0.0	\$42	0\$	\$0	\$42
2,542			587	0.0	0.0	\$42	0\$	0\$	\$42
2,542			567	0.0	0.0	\$42	9	0\$	\$45
2,542			567	0.0	0.0	\$42	\$0	0\$	\$45
2,542			587	0.0	0.0	\$42	0\$	0\$	\$45
2,542			267	0'0	0.0	\$42	0\$	0\$	\$45
2,542			567	0.0	0.0	\$42	0\$	0\$	\$42
8,742			908	0.0	0.0	89\$	0\$	0\$	\$9\$
9,652			1,173	0.0	0.0	\$87	\$0	0\$	\$87
17,032			756	0.0	0.0	95\$	0\$	0\$	\$56
157,060			2,519	0.0	0.0	\$188	0\$	9	\$188
17,032			758	0.0	0.0	95\$	0\$	ÇŞ	\$56
17,032			756	0.0	0.0	95\$	0\$	Ş	\$56
17,032			756	0.0	0'0	92\$	0\$	Ş	\$56
17,032			758	0.0	0'0	\$56	0\$	9	\$56
П									
17,032			756	0.0	0.0	\$56	\$0	\$0	\$56
			17,153	0	0	\$1,279	0	0	

ECO12 A-5 COST SAVINGS

Sheet q Of	15
or Estimate	
A (no design comp	peted)
,	•
ed By	
BIH	
Material	
Total	Total -
7 \$647	\$1,145
	\$1,145
	ļ
7 \$490	\$866
	\$866
	<u> </u>
7 \$594	\$1,050
	\$1,050
7 \$1,054	\$1,864
	\$1,864
7 \$1,054	\$1,864
	\$1,864
00 504	66 000
7 \$3,564	\$6,300
	\$6,300
-	
7: 60 564	46.000
7 \$3,564	\$6,300
	\$6,300
* *0.554	\$6.000
7 \$3,564	\$6,300
	\$6,300
	<u> </u>
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ECO13 A-5 COST SAVINGS

CONSTRUCTION COS	T ESTIMAT	Έ		Pebruary	1993	Sheet \O Of	is
Project EEAP Limited Energy Stud	у			Project No.	Basis for		
Fort Hunter-Liggett, Califor	nia				Code A	(no design comp	sted)
Keller & Gannon							
Drawing No.		Estimat			Checked	•	
ECO# A-5 (Install Solar Film)	Qu	antity	RJB	Labor	 	BIH laterial	
Line Item	No. Units	Unit Mess.	Per Unit	· Total	Per Unit	Total	Total Cost
Bldg 229							
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 229							\$6,300
Bldg 230							
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 230	1200	-	Ψ2.20	Ψ2,700	Ψ2.37	40,004	\$6,300
		<u> </u>					40,000
Bldg 240							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 240							\$1,260
Bldg 241							
Solar Film	56	SF	\$2.28	\$128	\$2.97	\$166	\$294
Total Bldg 241							\$294
Bldg 243				_			
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 243							\$1,260
Dide 044							
Bldg 244 Solar Film	100	05	00.00	AF 47	00.07	0740	44 000
	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bidg 244							\$1,260
Bldg 246							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 246							\$1,260
Bldg 247							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 247							\$1,260
			i				

ECO14 A-5 COST SAVINGS

CONSTRUCTION COST EST	IMAT	E		Pebruary	1993	Sheet Of	13	
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate		1
Location			-		Code A	(no design com	peted)	
Fort Hunter-Liggett, California Engineer-Architect					†			ı
Keller & Gannon								╛
Drawing No.		Estimat			Checked	•		1
ECO# A-5 (Install Solar Film)	I Qu	entity	RJB	Labor	<u> </u>	BIH Material	· · · · · · · · · · · · · · · · · · ·	4
Line Item	No. Units	Unit Meas.	Per " Unit	Total -	Per ~ Unit ~	Total	Total =: Cost =:	
Bldg 286								
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260	╛
Total Bldg 286					ļ 		\$1,260	-
Bldg 295								1
Solar Film	2866	SF	\$2.28	\$6,534	\$2.97	\$8,512	\$15,047	1
Total Bldg 295					<u> </u>		\$15,047	1
								┛
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				<u> </u>				1
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SIR	8.0	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.4	4.0	0.4	9.0	0.2	0.0	0.2	0.2	0.2	0.2	0.2	0.3
Savings	\$1,455	\$360	\$253	\$253	\$253	\$253	\$253	\$253	\$253	\$325	\$525	\$2,670	\$4,338	\$4,303	\$4,254	\$5,745	\$338	\$280	\$338	\$338	\$338	\$338	\$338	\$6,533
Contingency	\$1,786	\$1,351	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$2,908	\$2,908	\$9,827	\$9,827	\$9,827	\$9,827	\$9,827	\$1,965	\$459	\$1,965	\$1,965	\$1,965	\$1,965	\$1,965	\$23,471
Bond	\$1,624	\$1,228	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$2,643	\$2,643	\$8,834	\$8,834	\$8,934	\$8,834	\$8,834	\$1,787	\$417	\$1,787	\$1,787	\$1,787	\$1,787	\$1,787	\$21,337
OH & P	\$1,608	\$1,218	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$2,617	\$2,617	\$8,845	\$8,845	\$8,845	\$6,845	\$8,845	\$1,769	\$413	\$1,769	\$1,769	\$1,769	\$1,769	\$1,769	\$21,128
Sales Tax	\$1,237	\$935	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$2,013	\$2,013	\$6,804	\$6,804	\$6,804	\$6,804	\$6,804	\$1,361	\$318	\$1,361	\$1,361	\$1,361	\$1,361	\$1,361	\$16,251
Total	\$1,145	\$868	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,864	\$1,864	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300	\$1,260	\$294	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$15,047
O&M/YR	Ş	2	2	9	Q	8	0\$	9	2	\$	2	S	ន្ន	æ	S	8	&	Q.	8	Q.	2	&	2	8
Construction Cost	\$1,145	\$866	\$1,050	\$1,050	\$1,050	\$1,060	\$1,050	\$1,050	\$1,050	\$1,864	\$1,864	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300	\$1,260	\$294	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$15,047
Bullding	120	127	161	162	163	2	165	166	167	177	178	206	207	208	229	230	240	241	243	244	246	247	286	286

ECO21 A-5 COST SAVINGS

Construction Cost....Installed Cost

O&M/YR......Vestly maintenance scheduled as 2.5% of installed cost

Sales Tax.....8% of total OH & P......Contractors overhead and profit 30% Bond.....1%

Bond.....1%

Contingency......Estimators contingency 10%

.......

Life Cycle Cost Analysis Summary ECO A-5 Energy Conservation Investment Program (ECIP) Sheet 13 of 13

Location:	Fort Hunter Lig	gett, California	Region No. 4		Project No. 16-403-10
Project Title:	Install Solar Film				Fiscal Year FY96
	tion Name: ECO#	A-5	- 1-1-5	r VEADS	Property KELLER & GANNOL
Analysis Dat	e: March 1993		Economic Life:	5 YEARS	Preparer: KELLER & GANNOI
4	. 0				
Investment A. Construct			\$105,275	•	
B. SIOH	1011 00345		\$5,790	•	
C. Design Co	net		\$6,317	•	
•	t (1A+1B+1C)		\$117,382	3	
	alue of Existing E	auipment			
	ity Company Reb				
	stment (1D-1E-1F				\$117,382
	avings (+)/Cost(-)				
Date of NIST	TR 85-3273-X Use	d for Discount Facto	ors		
Energy	Cost	Saving	Annuai \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	355.0	\$ 7, 7 53	4.49	\$34,812
B. Dist	\$4.98		\$0 =	4.77	\$0 ==
C. Propane	\$7.87		\$0 ~	4.79	\$0 =
D. Other			_		
E. Demand S	Savings				
F. Total	_		\$7,753		\$34,812
3. Non Ener	gy Savings (+) or	Cost (-):			
A Annual Re	ocurring (+/-)		\$0 æ		
	Factor (Table A)			4.45	
	ed Savings/Cost ((3A x 3A1)			\$0 <i>2</i> 2
B. Non Recu	rring Savings (+)	or Cost (-)			
item	Savings(+)	Year of	Discount	Doscounted S	av-
ICOTT!	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)	(4)
4					
a. b.			-		
					-
c. d. Total					
C Total Non	Energy Discounte	ed Savings (3A2+3E	3d4)	\$0 =	
		3A+(3Bd1/E∞nomi	c Life)):	15	
	Discounted Savin			\$34,8	
	Investment Ratio			-28.3	30 nek
7 Adinoted	Internal Pate of Pa	otium (AIRR).		-28.3	U /9

Keller & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO A6	PROJECT 16-403-70
DATE HARCH 1993	REDUCE GLASS AR	SHEET NO. OF SHEETS
REV 19		

DESCRIPTION OF ACTION

Reducing building wall glass area.

Improves the overall wall thermal

characteristics. Heating and cooling

energy use are reduced because

walls replacing window areas will

have a U value of about 0.06

while the glass being replaced has

a U value of about 0.75 to 1.1.

Solar gain is also reduced, saving

additional energy during the cooling

souson.

BUILDINGS INCLUDED

No buildings at FHL are seen to have excessive glass areas, thus, this Eco is not evaluated.

Σ	Keller	&	Gannon
	Enginee	rs-	-Architects

COMPUTED BY BIH	Edo A7	PROJECT 16-403-10
CHECKED BY	Fredall Shading	THEFTEN
DATE MH72C1- 1993	Install Shading	\ os 12 ousern
REV19	Devices	SHEET NO OF SHEETS

Description of AcTION

shading devices installed to keep windows, doors and for wall sections in shade during summer day-times will reduce the amount of solar heat-gain, and, thus, the amount of energy reeded to provide space cooling.

BUILDINGS INCLUDED

The following buildings were identified during field investigations:

120 fire Station Idenmatory

127 BOB

161-167 Admin Buildings

177 Tech. Library

178 Child Development Conter

240,235,236,237,243,244,246,247,286 Admin Bidgs.

241 GM Facility.

ENERGY SAUINGS

Energy Savings for shading these boildings are based on TRACE-600 runs of a typical structure and then factored to each of the above buildings based on window areas in conditioned spaces:

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY PUB	ECO#	47		403-10
CHECKED BY BIH DATE MARCH 1993		HOING DEVICES	Fr. Th	ENG
DATE MATRICE 1993 19			SHEET NO.	OFSHEETS
19	Pare Co	20 AMARTSUS		SREEIS
THE FOLLOWIH	a BLILDIH	n - Was - Mas	TUEN -F	
·				
A REPRESENT	ATIVE TEA	PUE 600 ANTAL	7515	
				
		50FT		
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200 CFM				CONTROLLAS
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			OPLE OUF	PRSN 10 FT
GUAS DEPEN	-106 HALL		 	
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Roof		WACE:		
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ECO# A-4 ECO# A-3 ECO# A-5

SHEET SOIT 13 ECOH 7 V 600 PAGE 3

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

- PACKAGED TERMINAL AIR COND. PTAC System Peak Mo/Hr: 7/17 Mo/Hr: 13/ 1 Mo/Hr: 7/17 Peaked at Time ==> OAD8: 27 CADE: 96 OADS/WB/HR: 96/ 70/ 70.0 Outside Air ==> Percnt * Space Peak Coil Peak Percnt Net Percnt * Space Ret. Air Ret. Air Space Of Tot * Tot Sens Of Tot Total Of Tot * Sensible Space Sens Sensible Latent Sens.+Lat. (%) * (Btuh) (Btuh) (Btuh) (%) 7 (Btuh) (%) * (Btuh) (Btuh) (Btuh) Envelope Loads 0.00 * ٥ 0 0.00 0.00 * ٥ 0 0 Skylite Solr 0 0.00 * 0 0.00 * 0 O 0.00 0 Skylite Cond 0 0 5.97 * 0.00 * -1,499 10.08 0 1,944 Roof Cond 0 1,944 46.44 * 12,250 12,250 0 0 0.00 37.63 * 0 12,250 Glass Solar 1,283 4.87 * -5,253 -5.253 35.35 1,283 3.94 * O Glass Cond 1,283 32.87 * 34.00 * 8,671 -6,429 -8,107 54.56 11,066 2,395 Wall Cond 8,671 0.00 * 0 0.00 * ۵ 0 Ω 0.00 0 Partition 0.00 * 0.00 0 0.00 * 0 0 0 Exposed Floor 0.00 * 0 ٥ 0.00 0 0.00 * ٥ Infiltration ٥ 84.17 * -11,682 -14,859 100.00 26,544 81.55 * 22,205 4,340 Sub Total==> 22,205 Internal Loads 1,707 5.24 * 1.707 6.47 * 0 0 0.00 Lights 1,707 4,300 13.21 * 1,800 6.82 * 0 0 0.00 4,300 People 0.00 * 0 0 0.00 0.00 * 0 0 0 Misc 13.29 * 0 0.00 3,506 6,007 18.45 * 6.007 0 Sub Total==> 2.53 * -516 0.00 668 0.00 * 0 582 -582 Ceiling Load 0.00 * 0.00 0 0 0.00 * 0 0 Outside Air O 0.00 * 0.00 = 0.00 * 0 Sup. Fan Heat 0.00 0.00 * 0.00 * Ret. Fan Heat 0 0.00 * 0.00 0.00 * 0 Duct Heat Pkup 0.00 * 0.00 0.00 * OV/UNDR Sizing 0 0.00 0.00 * 0.00 * 0 Exhaust Heat 0.00 0.00 * 0.00 * 0 Terminal Bypass -12,198 -14,859 100.00 32,551 100.00 * 26,379 100.00 * 3,757 Grand Total ==> 28,793 -----AREAS-----------cooling coil selection-----Gross Total Glass (sf) (%) " Leaving DB/WB/HR Total Capacity Sens: Cap. _ Coil Airfl Entering DB/WB/HR 1.000 Floor (cfm) Deg F Deg F Grains Deg f Deg F Grains (Tons) (Mbh) (Mbh) 0 1,602 76.9 63.1 64.2 Part. 59.8 56.3 66.9 32.6 30.1 Main Clg 2.7 0 -0 . 0.0 . 0.0 . 0.0 .. 0.0 .. 0.0 ExFlr 0.0 Aux Clg 0.0 0.0 0.0 1,000 ~ 0.0 0.0 0.0 Roof 0 3 0 0.0 0.0 0.0 0 Opt Vent 0.0 0.0 0.0 140.4 10 1,400 --Walt 2.7 32.6 Totals -- TEMPERATURES (F)--------AIRFLOWS (cfm)------ -- ENGINEERING CHECKS--------HEATING COIL SELECTION-----Type - Clg 4 Htg = Type Cooling Heating Cig % CA 0.0 Capacity Coil Airfl Ent " Lvg -1.60 = SADB# 59.8 = 75.0 0 ≤ Clg Cfm/Sqft 0 == (cfm) Deg F Deg F Vent... (Hbh) Plenum = 76.8 64.5 0 = 0 " Clg Cfm/Ton 590.46 1,602 64.5 75.0 Infil Main Htg -18.3 1,602 Clg Sqft/Ton Return - 76.9 64.8 1,602 -368.66 0.0 0.0 . Supply 0.0 Aux . Htg 0 - Clg Btuh/Sqft 32.55 Ret/QA = 76.9 64.8 0 🧳 59.8 Minefm -Preheat -0.0 1,602 _ 64.8 10 * Runernd = 75.0 . 68.0 1,602 1,602 -No. People 0.0 _ Return 0.0 0 0.0 Reheat Fn HtrTD = 0.0 .. 0.0 .. 0 . 0.0 0 Htg % CA 0.0 0.0 . Exhaust Humidif 0.0 1.60 Fn BldTD 0.0 0.0 ~ Hta Cfm/Saft 0 Rm Exh 0 0.0 0.0 0.0 Opt Vent Htg Stuh/SqFt -18.31 Fn Frict 0.0 Ω Auxil 0 -18.3 Total

ELO# A-9 ELO# A-5 ELO# A-5 ELO# A-7

EXTRET 40P 13

ECOTA - 7 V 600

PAGE

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

System	1	Peak	PTAC	- PACKAGE	D TERMINAL	AIR COND.	•							
******	*****	*****	COOLING COIL	PEAK ****	*****	******	***	*** CLG S	PACE	PEAK ****	****** HE	ATING COIL	PEAK	****
Peak ed a	t Time :	E=>	Mo/Hr:	7/17			*	Mo/H	ir: 7	7/17	*	Mo/Hr:	13/ 1	
Outside .	Air ==>	0	ADB/WB/HR:	96/ 70/ 70.	0		*	OAD	8: 9	76	*	OADB:	27	•
							*				*			
		Space	Ret. Air	Ret. Air	Net	Percnt	*	Spa	Ce	Percnt	* Space P	eak Coil	Peak	Percnt
		Sens.+Lat.	Sensible	Latent	Total	Of Tot	*	Sensib	ol e	Of Tot	* Space S	ens Tot	Sens	Of Tot
Envelope	Loads	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(Btu	h)	(%)	* (Bt	uh) (Btuh)	(%)
Skylit	e Solr	0	0		0	0.00	*		0	0.00	*	0	0	0.00
Skylit	e Cond	0	0		0	0.00	*		0	0.00	*	0	0	0.00
Roof C	ond	0	2,608		2,608	9.41	*		0	0.00	*	0 -	1,494	9.40
Glass	Solar	4,970	0		4,970	17.92	*	5,6	600	26.45	*	0	0	0.00
Glass	Cond	2,421	0		2,421	8.73	*	2,0	102	9.45	* -6,i	291 -	6,291	39.60
Wall C	ond	9,228	2,495		11,723	42.28	*	9,1	49	43.22	* -6,·	429 -:	8,102	51.00
Partit	ion	. 0			. 0	0.00	*		0	0.00	*	0	0	0.00
Expose	d Floor	0			0	0.00	*		0	0.00	*	0	0	0.00
	ration	0			0	0.00	*		0	0.00	*	0	0	0.00
Sub To		16,618			21,722		•	16,7	51	79.12	* -12, ¹	720 -1	5,887	100.00
Internal		,,,,,,	27.02		2.,		*				*		•	
Lights		1,707	0		1,707	6.15	•	1,7	707	8.06	*	0	0	0.00
People		4,300	•		4,300		*	1,8		8.50	*	0	0	0.90
Misc		0	0	0	0		•	•	0	0.00	•	0	0	0.00
Sub To	tal==>	6,007	0		6,007	21.66	*	3,5	60	16.56	*	0	0	0.00
Ceiling	Load	998	-998		. 0	0.00	*	9	13	4.31	• -	635	0	0.00
Outside /	Air	0	0	0	0	0.00	*		0	0.00	*	0	0	0.00
Sup. Fan	Heat				0	0.00	*			0.00	*		0	0.00
Ret. Fan	Heat		0		0	0.00	*			0.00	*		0	0.00
Duct Hear	t Pkup		0		0	0.00	•			0.00	*		0	0.00
OV/UNDR S		0			0	0.00	*		0	0.00	*	0	0	0.00
Exhaust i	Heat		0	0	0	0.00	*			0.00	•		0	0.00
Terminal	Bypass		0	0	0	0.00	*			0.00	•		0	0.00
							*				•			
Grand To	tal==>	23,622	4,106	0	27 ,728	100.00	•	21,1	70	100.00	• -13,3	555 - 15	,887	100.00
			·····	LING COIL SE	LECTION							AREAS		
	Total	Capacity		Coil Airfl		ng DB/WB/	HR	Leavi	ng DB	/WB/HR	Gross Tot	tat Gla	SS (S1	f) (%)
	(Tons)		(Mbh)	(cfm)		F Grain		Deg F D	eg F	Grains	Floor	1,000		
Main Clg	2.3		25.2	1,230		3.5 66	_		56.0	64.0	Part	0		
Aux Clg	0.0		0.0	0			.0	0.0	0.0	0.0	Exflr	0		
Opt Vent	0.0			o			.0 -	0.0	0.0	0.0	Roof	1,000		0 = 0
Totals	2.3			•							Wall	1,400	1	40
	HEATI	NG COIL SE	ECTION		AIR	FLOUS (c	fm)		E	NGINEERIN	G CHECKS	TEMPER	ATURES	(F)
	Capaci			Lvg =		Cooling		eating		% OA	0.0			- Htg
	(Mbh	•	fm) Deg F	-	Vent			0	_	Cfm/Sqft		SADB	59.1	_
Main Htg	-18	-	230 64.3	78.0	Infit	_		0	-	Cfm/Ton	532.33	Plenum	78.1	
Aux Htg		.0	0 0.0		Supply	1,230		1,230	_	Sqft/Ton		Return	78.1	
Preheat			230 64.7		Mincfm	-	:	0 -	-	Btuh/Sqf		Ret/QA		64.7
Reheat		.0	0 0.0		Return	1,230		1,230		People	10	Runernd	75.0	
Humidif		.0	0 0.0	0.0	Exhaust	0		0		X OA	0.0	Fn MtrTD		
Opt Vent		.0	0 0.0	0.0	Rm Exh	Ö		0	-	Cfm/SqFt		Fn BldTD		
Total	-18				Auxi L	0		0	_	Btuh/SqF1		Fn Frict		
						-			-	•				

Keller & Gannon

	00/41/ 0 // 11/01/ 0//122	Engineers-Architects
9 10	1 - 9 -	PROJECT 16-403-10
COMPUTED BY	FCO# 4-7	- PHOJECT TO FEED TO
DATE 1973	HISTARU SHOWA DEVICES	
REV19	ENERAL CALLLATIONS	SHEET NO OF SHEETS
11124	- THE TRACE CHECK TIME	
coolw	4.	2 - 2
BASEL	JUE 32551	•
1517 3124	anie 50 3 3 1	
FCO#	A-7 27 72 3 131	Tun 4,892 Bint/1000
teco	n· 1 2 · 10 3 · 151	-1/0 10 11/1/10=
		= 4,892 BTUH/SF
	•	11010 01011131
	Sume Fer = 10	
•	1111	= 4911471
	AUMTS = 4.892/10) Them ISE
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FORM 101-1/8

	Propane Fuel Oil	\$WR \$WR Total		\$0 \$0 \$242		09\$ 0\$ 0\$				\$0 \$0 \$42	\$0 \$0 \$42	\$0 \$0 \$42	\$0 \$0 \$42	0\$	\$0 \$0 \$42	\$0 \$0 \$42	89\$ 0\$ 0\$	28\$ 0\$ 0\$						\$0 \$0 \$56	\$0 \$0 \$188	\$0 \$0 \$56	\$0 \$0	\$0	\$0		\$0 \$0	
Savings	Electric	\$/YR		\$242		09\$				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$188	\$56	\$58	\$56	\$56		\$56	
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0	
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Savings	Electric	Kwh/Yr		3,252		802				292	587	287	587	587	287	587	906	1,173						756	2,519	756	758	756	756		756	
	Fuel Oil	MBTU/Yr	-																													0
W/ECO-A7	Propane	MBTU/Yr										-																				
Energy Use	Electric	Kwh/Yr		7,583		006				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	157,060	17,032	17,032	17,032	17,032		17,032	
Bidg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	206	207	208	229	230	240	241	243	244	246	247	252	286	295

SHEET TORIS ELO A-I

		Total	\$221		₹ 0	£ 37	\$214			\$286	\$286	\$286	\$286	\$286	\$286	\$286												î		\$838			
	Fuel Oil	1 AVS	\$		8	2	2			2	2	o \$		æ	0\$	2														24 38			£43R
Savings	Propane	\$/YR	\$158		\$294	\$307	\$157			2184	\$194	\$184	\$184	\$194	\$194	\$194														ŝ			₹9.97 K
	Electric	\$/YR	\$63		\$118	\$130	828			285	\$92	\$85	\$85	\$85	\$92	\$ 85														\$503			\$1512
	Fuel Oil	MBTU/Yr	0.0		0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0														87.6			AA
Savings	Propane	MBTU/Yr	20.1		37.4	39.0	19.9			24.7	24.7	24.7	24.7	24.7	24.7	24.7														0.0			980
	Electric	Kwh/Yr	846		1,554	1,747	775			1,234	1,234	1,234	1,234	1,234	1,234	1,234														6,745			802.00
	Fuel Of	MBTU/Yr	·		•	•	•			•	•			•		•														831.4			
Energy Use W/ECO-A4	Propare	MBTU/Yr	23.9		145.8	154.1	17.4			46.3	46.3	46.3	46.3	46.3	46.3	46.3														•			
Energy Use	Electric	Kwh/Yr	4,972		11,148	1,036	4,490			2,638	2,638	2,638	2,638	2,638	2,638	2,638														20,340			
ECO's	FEE OF	MBTU/Yr																	3944.7	1375	1375	1375	1375							919			
Use W/Previous ECO's	Propare	MBTU/Yr	44	768.5	183.2	193.1	37.3	52.5		11	71	71	71	7,1	7	7	6.1	63.8						38.2	153	38.2	38.2	38.2	38.2		38.2	1040	
Energy Use	Electric		5,818	15,216	12,702	2,783	5,265	418	823	3,872	3,872	3.872	3,872	3,872	3,672	3,872	10,869	12,405	108,696	268,495		286,764	276,379	18,805	162,971	18,805	18,805	18,805	18,805	27,085	18,805	629,841	
Heating	>		66.0%	80.09	65.0%	64.0%	61.0%	80.79	¥	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	86.4%	65.0%	70.8%	71.4%	72.1%	71.9%	71.2%	%0'29	66.6%	%0'29	\$0.79	67.0%	80.78	73.0%	67.0%	58.7%	
Cooling	Degree	Hours	21,633	21.833	21,633	21,833	21,833	21,833	9,003	15,420	15,420	15.420	15,420	15,420	15.420	15,420	15,420	19,953	21,833	21,633	21,833	21,833	21,833	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	21,833	
Heating	Decree	Hours	93,192	85,120	93,192	85,120	93,192	93,192	11,702	60,531	60.531	60,531	60.531	60.531	60.531	155,09	60,531	74,412	116,562	85,120	85,120	65,120	85,120	60,531	60,531	60,531	60,531	60,531	60,531	39,883	60,531	65,120	
Area	GS	ì	1.090	9.120	2.001	2.250	888	7,172	2,025	2.250	2.250	2 250	2.250	2.250	2.250	2.250	3,589	3,599	16,768	27,238	26,999	26,692	36,063	3,000	10,000	3,000	3,000	3,000	3,000	12,299	3,000	41,002	
Blda			•	120	124	127	131	4	156	161	182	3	3	58	3	167	177	178	206	207	208	228	230	240	241	243	244	246	247	252	586	295	

No. Electric Propare Fuel OI Electric Propare Fuel OI Electric Propare Fuel OI Electric Propare Fuel OI 10,835 MSTU/Yr MSTU/	W/ECO-A3			Savinge			Savinge				Energy Use	Energy Use W/ECO-AS		Savings			Savings			
	Propene Fuel Oil Electrio	Fuel Oil Electric	Electrio	Propane			_	Propane	_		Electric	_	_	Electric	Propane	Fuel O	Electric	Propane	Fuel Oil	
1,0,000	KWA/Yr MBTU/Yr KWA/Yr NBTU/Yr	MBTU/Yr Kwh/Yr MBTU/Yr	Kwh/Yr MBTU/Yr	. 1		MBTU/Yr	EV.	\$ ∕YR		Total	Kwh/Yr	_	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$WR	\$/YR	\$/YR	Total
1,702 1,0855 1,081 1,0																				
1,702											10,835			198,	0	0	\$327	8	8	\$327
1,702 1,091 0 591 590 591 1,091																				
\$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c											-,702			1.081	0	0	-83 -83	8	8	ž
\$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c																				
100 100																				
10 10 10 10 10 10 10 10																				
10 10 10 10 10 10 10 10											3,100			82	٥	٥	753	8	8	\$57
10 10 10 10 10 10 10 10											3,100			283	•		\$57	8	8	\$57
\$100 \$100 <th< td=""><td></td><td></td><td></td><td></td><td>ļ</td><td></td><td></td><td></td><td></td><td></td><td>3,100</td><td></td><td></td><td>22</td><td>٥</td><td>•</td><td>153</td><td>8</td><td>8</td><td>183</td></th<>					ļ						3,100			22	٥	•	153	8	8	183
\$100 \$100 \$73 \$0 \$57 \$0 <											3,100			22	٥	0	\$57	8	ş,	\$57
\$100 \$100 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3,100</td><td></td><td></td><td>52</td><td></td><td>0</td><td>153</td><td>8</td><td>8</td><td>153</td></th<>											3,100			52		0	153	8	8	153
\$18 \$20 \$100 \$73 \$0 \$57 \$0 <											3,100			22			\$57	8	8	753
\$16 \$20 <td>4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>3,100</td> <td></td> <td></td> <td>783</td> <td>0</td> <td>0</td> <td>\$57</td> <td>0\$</td> <td>Q</td> <td>\$57</td>	4										3,100			783	0	0	\$57	0\$	Q	\$57
1,0,825 1,580 0 8118 80 80 80 80 80	10,629 5.00 - 240 1	- 240 1	-	-		0	818	8	8	\$27	9,648			080	0	0	\$73	08	Ç,	\$73
100 642 9,054 0 6,054 0 6,00 6											10,825			1,580	0	0	\$118	08	Q	\$118
Second S											100,642			8,054	0	0	009\$	08	08	009\$
12,000 1											255,412			13,083	0	0	\$49.75	Q	80	\$975
12,024 12,024 12,027 12,021 0 0 6 86-56 80 80 80 80 80 80 80 80 80 80 80 80 80											255,527			12,968	0	0	\$987	08	\$0	£963
17,787 17,787 1,732 0 0 1,81,291 80 80 80 80 80 80 80 80 80 80 80 80 80						H					273,943			12,821	0	0	950\$	08	90	\$956
1,7787 1,018 0 678 80 80 80 80 80 80 80											259,057			17,322	0	0	\$1,291	8	08	\$1,291
8206 840 0 640 0 850 80											17,787			1,018	0	0	878	0\$	80	\$76
\$250 \$60 \$70 \$7787 \$1,018 \$0											162,123			848	0	0	520\$	08	08	2983
\$2.00 \$0.00 <th< td=""><td></td><td></td><td></td><td></td><td>- 1</td><td></td><td></td><td></td><td></td><td></td><td>17,787</td><td></td><td></td><td>1,018</td><td>0</td><td>0</td><td>878</td><td>8</td><td>90</td><td>876</td></th<>					- 1						17,787			1,018	0	0	878	8	90	876
\$206 \$60 \$70 \$70 \$60 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>17,787</td> <td></td> <td></td> <td>1,018</td> <td>0</td> <td>0</td> <td>876</td> <td>08</td> <td>08</td> <td>876</td>											17,787			1,018	0	0	876	08	08	876
\$206 \$0 \$17787 \$1,016 \$0											17,787			1,018	0	0	876	08	90	\$78
\$206 \$0 \$436 \$732 17,787 1,016 0 0 \$76 \$0 \$90 \$313 \$9 \$436 \$10,147 19,694 0 0 \$1,468 \$0 \$0 \$313 \$9 \$436 \$436 \$0 \$1,772 \$0 \$0											17,787			1,016		0	97.8	Q.	2	27
17,787 1,016 0 0 \$70 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	16,378 - 744 3,962 0	3,962	L	0		96	\$206	08	8436	\$732										
\$313 \$9 \$436 010,147 19,694 0 0 \$1,468 \$0 80 80 80 80 80 80 80 80 80 80 80 80 80											17,787			1,018	٥	۰	878	S.	S	878
\$313 \$9 \$436 104,882 0 0 87,772 80 80											610,147			19,694	0	0	\$1,468	₽	0\$	\$1,468
	4,202	4,202	4,202			98	\$313	80	\$436					104,262	0	0	\$7,772	Q	8	

FLEW HOTE

	1	_							_			_	_		_				_		_	_	T :					-				ľ ·		
		Total		\$242		09\$				\$42	\$42	\$42	\$42	\$42	\$42	\$45	89\$	28\$						\$56	\$47	\$56	\$56	\$26	\$26		\$26			
	Fuel Oil	\$/YR		\$0		\$0				\$0	\$0	\$0	\$0	\$0	\$0	\$0	0\$	\$0						\$0	\$0	\$0	\$0	\$0	\$0		\$0		0	
	Propane	\$/YR		\$0		\$0				\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0						\$0	\$0	\$0	\$0	\$0	\$0		\$0		0	
Savings	Electric	\$/YR		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56	-	\$1,138	
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0	
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0	
Savings	Electric	Kwh/Yr		3,252		802				267	267	292	292	292	267	267	906	1,173						756	630	756	756	756	756		756		15,264	
	Fuel Oil	MBTU/Yr																																1
W/ECO-A7	Propane	MBTU/Yr						-																										
Energy Use	Electric	Kwh/Yr		7,583		900				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	161,493	17,032	17,032	17,032	17,032		17,032			
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	506	207	208	229	230	240	241	243	244	246	247	252	286	295	-	

ECO23 A-7 COST SAVINGS

CONSTRUCTION COST ES	TIMAT	E		Pebruary	1993	Sheet Of	13
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate	
Fort Hunter-Liggett, California					Code A	(no design comp	eted)
Engineer-Architect					1		
Keller & Gannon		Estimat	tor		Checked	Bv	
ECO# A-7 (INSTALL SHADING DEVIC	CES)		RJB			BIH	
Line Item		entity Unit	Per	Labor	Per	Aaterial	Total .
	Units	Meas.	Unit	Total	Unit	Total	Cost
BLDG120							
Indoor Blinds	218	SF	\$0.52	\$113	\$6	\$1,282	\$1,395
Total Bldg 120							\$1,395
BLDG 127	-						
Indoor Blinds	165	SF	\$0.52	\$86	\$6	\$970	\$1,056
Total Bidg 120							\$1,056
DI DO 404 400	<u> </u>						
BLDG 161-162		-	00.50	0404	00	04.470	04.000
Indoor Blinds	200	SF	\$0.52	\$104	\$6	\$1,176	\$1,280
Total Bidg 161-162	1						\$1,280
BLDG 177							
Indoor Blinds	355	SF	\$0.52	\$185	\$6	\$2,087	\$2,272
Total Bldg 355	ļ	ļ				+	\$2,272
BLDG 178		-					
Indoor Blinds	355	SF	\$0.52	\$185	\$6	\$2,087	\$2,272
Total Bldg 178							\$2,272
BLDG 240	-						
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bidg 240	240	0.	40.02	V.20	45	41,411	\$1,536
BLDG 241			10.55			45.5	
Indoor Blinds	56	SF	\$0.52	\$29	\$6	\$329	\$358
Total Bldg 241							\$358
· · · · · · · · · · · · · · · · · · ·							
	-						
	<u> </u>	1				<u></u>	

ECO24 A-7 COST SAVINGS

CONSTRUCTION COST E	TIMAT			Date Prepared February		Sheet Of	1>
	S I IIVIA I			Project No.	Basis for	etimete	
Project				Project No.			
EEAP Limited Energy Study				<u> </u>	Code A	(no design comp	eted)
Fort Hunter-Liggett, California							•
, Keller & Gannon							
Drawing No.		Estimat			Checked E	-	
ECO# A-7 (INSTALL SHADING DEV	ICES)	untity	RJB	Labor		BIH aterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total ·	Total Cost -
BLDG 243							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 243							\$1,536
BLDG 244							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 244							\$1,536
BLDG 246							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bidg 246							\$1,536
BLDG 247							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 247							\$1,536
BLDG 286							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 286							\$1,536
			<u> </u>		 		
		L	<u> </u>	L	l	1	

SHEET 120F 13 FLO * A-7

O&M/YR	Sales Tax OH & P B	Bond	Contingency	Savings	SIR
\$0 \$1,395	\$1,507 \$1,959 \$1	81,978	\$2,176	\$1,076	0.5
\$0 \$1,056	\$1,140 \$1,483 \$1	\$1,497	\$1,647	\$267	0.2
\$0 \$1,280	\$1,382 \$1,707 \$1	\$1,815	\$1,997	\$186	0.1
\$0 \$1,280	\$1,382 \$1,797 \$1	\$1,815	\$1,907	\$186	2.0
\$0 \$1,280	\$1,362 \$1,707 \$1	\$1,815	\$1,997	\$186	0.1
\$0 \$1,280	\$1,382 \$1,797 \$1	\$1,815	\$1,997	\$186	1.0
\$0 \$1,280	\$1,382 \$1,797 \$1	\$1,815	\$1,997	\$186	2
\$0 \$1,280	\$1,362 \$1,707 \$1	\$1,815	\$1,997	\$186	9.
\$0 \$1,280	\$1,382 \$1,797 \$1	\$1,815	\$1,997	\$186	0.1
\$0 \$2,272	\$2,454 \$3,190 \$3	\$3,222	\$3,544	\$303	0.1
\$0 \$2,272	\$2,454 \$3,190 \$3	£3,222	\$3,544	\$387	0.1
\$0 \$1,536	\$1,659 \$2,157 \$	12,178	\$2,396	\$249	0.1
\$0 \$358	\$387 \$50S	\$508	\$558	\$200	0.4
\$0 \$1,536	\$1,659 \$2,157 \$	\$2,178	\$2,396	\$240	0.1
\$0 \$1,536	\$1,659 \$2,157 \$:	\$2,178	\$2,396	\$249	0.1
\$0 \$1,536	\$1,659 \$2,157	12,178	\$2,396	\$249	0.1
\$0 \$1,536	\$1,659 \$2,157 \$	\$2,178	\$2,396	\$249	0.1
\$0 \$1,536	\$1,659 \$2,157	\$2,178	\$2,396	\$240	0.1
	41,000				

Construction Cost....Installed Cost

O&M/YR......Yearly maintenance scheduled as 2.5% of installed cost

Sales Tax......8% of total # 2 . s.f. . m # 16 . g.11 1 . 2.

Bond.....1%

Confingency......Estimators contingency 10%

ECO A-7 COST SAVINGS

Life Cycle Cost Analysis Summary ECO A-7 Energy Conservation Investment Program (ECIP) Sheet 13 of 13

Location:	Fort Hunter Lig		Region No. 4		Project No. 16-403-10	
	Install Shading D				Fiscal Year FY96	
	tion Name: ECO#	ŧ A-7		- VEADO	Property VELLER & CANING	٠.
Analysis Dat	e: March 1993		Economic Life:	5 YEARS	Preparer: KELLER & GANNO	יוע
1. Investmen	nt Costs					
A. Construct	ion Costs		\$18,306			
B. SIOH			\$1,007			
C. Design Co	ost		\$1,098			
D. Total Cos	t (1A+1B+1C)		\$20,411			
	alue of Existing E	quipment				
	ity Company Reb					
G. Total Inve	estment (1D-1E-1F	7)			\$20,411	
	avings (+)/Cost(-)	: ed for Discount Facto				
Date of NIST	IH 85-3273-X USE	d for Discount Pack	<i>n</i>			
Energy	Cost	Saving	Annual \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec.	\$21.84	17.0	\$371	4.49	\$1,667	
B. Dist	\$4.98		\$0	4.77	\$0	
C. Propane	\$7.87		\$0	4.79	\$0	
D. Other						
E. Demand S	Savings					
F. Total	-		\$371		\$1,667	
3. Non Energ	gy Savings (+) or	Cost (-):				
A. Annuai Re	ecurring (+/-)		(\$286)			
	Factor (Table A)			4.45		
	ed Savings/Cost	(3A x 3A1)			(\$1,273)	
B. Non Recu	rring Savings (+)	or Cost (-)				
Item	Savings(+)	Year of	Discount	Doscounted	d Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cos	rt(-)(4)	
a.						
b			_			
C.			-			
d. Total				•	,,	
C Total Non	Energy Discounte	ed Savings (3A2+3E	ld4)	(\$1,273	3)	
4. Simple Pa	yback 1G/(2F3+3	3A+(3Bd1/Economic	c Life)):		239.3 Years	
	Discounted Savin				\$394	
	Investment Ratio				0.02	
	internal Rate of Re			-63	3.45%	

KELLER & GANNON **Engineers & Architects** Quality Services Since 1941

FAN

COMPUTED BY BIH	ECO # B-1	PROJECT <u>/6-403-16</u> FHL EEAP
CHECKED BY	DUTY CYCLING	SHEET NO / OF 5 SHEETS
REV 19	ムラフ付いけいと	SHEET NO/_ OF SHEETS

RESPONSE TO REVIEW COMMENT: FORSCOM EEAP REVIEW COMMENTS DATED 4/2/93, NARESH KAPUR, PE, FCEN-RDF, COMMENT NO. 12.

OTHER BUILDINGS WITHIN LIST OF SIGNIFICANT ENERGY USING BLOGS ARE CONSIDERED, BUILDINGS CONSIDERED:

101	HACIENDA -		CONTROL	ELEC. RES. HTR.S.
120	FIRE STATION	_	CONTROL	EAST SIDE AND FAN
161	ADMINU. BLOGS	-	LONTROL	AHU FANS
162		-		- //
163		-		-//
164	//	_		- //
165		-		//
166	 11 	-		- //
167		-		- //
177	TECH, LIBRARY			
178	CHILD, DEVICIOTE	-		- 11
182	COMMISSARY	_		- 11
190	CHAPEL	_		<i>"</i>
197	ADMIN BLOG RED	-		· //
209	SNACK BAR	_		<i>u</i>
	CLINIC	_		11
311	SWIMMING POOL	_	- COUTROL	CIRC PUMP(S)
212	GYMNASIUM	-	CONTROL	ahu fans
235	ADMIN. BLDGS.	~	_	//
236	//	-	-	//
237	<i>!</i> /	-		- //
338	//	-		//
240	11	-		-//
341	SM FACILITY	-		<i>"</i>
243	ADMIN. BLOG.	-		//
244	//	-		
246	<i>[1</i>	-		//
247	H	_		//

KELLER & GANNON Engineers & Architects Quality Services Since 1941

COMPUTED BY BIH		PROJECT 16-403-10
COMIT OTED BY	_ECO# B-/	FHL EEAP
DATE JUNE 1993	DUTY CYCLINGS	
DATE 100E 1973		SHEET NO. 2 OF 5 SHEETS
REV 19	ADDENDUM	SHEET NO. 2 OF 3 SHEETS

BUILDINGS CONSIDERED, CONTINUED:
252 VEHICLE MAINT, SHOP - CONTROL HW ILINE PUMP
256 // //
259 // //
286 ADMIN. BLDG CONTROL HVAC FANS
287 REC. CENTER - "
288 GEN, PURP, WHSE
290 ELECTRONIC EQUIP. FAC - "
29 / LOWT. HUMID. WHS E "
301 ADP 3012DING 11
ONLY THOSE HOTORS & OTHER ELECTRIC LOADS WHICH ARE CONTINUOUS OR ARE DEED DURING PEAK ELECTRICAL USE PERIODS ARE CONSIDERED
IN MOST CASES, LOADS INCLUDE ONLY THE FAN FOR HUAC SUPPLY PRETURN AIR. IT IS NOT PROPOSED TO CONTROL COMPILESSORS ON THESE SIMPLE ROOF-TOP TYPE UNITS. THE FOLLOWING TABLES INDICATE ENERGY & COST SAUNGS.
BASIS ASSUMES LOADS TURINED OFF TOMIN

SHEET 30F5

ECO B-1 (Duty Cycling) Cost Savings (Addendum June 1993)

SIR	(2)	4.66	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.53	0.14	0.11			0.13			0.43	0.36			1.07	0.80	0.05	0.11	0.11	0.11			1.92	0.11
Simple	Payback	2.51	107.91	107.91	107.91	107.91	107.91	107.91	107.91	107.91	22.10	80.93	107.91			92.49			26.98	32.37			10.96	14.55	215.82	107.91	107.91	107.91			6.09	107.91
Invest	\$	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619			\$2,619			\$2,619	\$2,619			\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619			\$2,619	\$2,619
Demand	\$LCC	\$12,215	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$1,386	\$329	\$284			\$331			\$1,136	\$946		-	\$2,795	\$2,106	\$142	\$284	\$284	\$284			\$5,031	\$284
Demand	\$/Yr	\$1,044	\$24	\$24	\$24	\$24	\$24	\$24	\$24	\$24	\$118	\$32	\$24	\$12	\$16	\$28	\$81	\$16	\$97	\$81	\$158	\$81	\$239	\$180	\$12	\$24	\$24	\$24	608\$	\$121	\$430	\$24
Demand	kW Saved	9.67	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	1.10	0.30	0.22	0.11	0.15	0.26	0.75	0.15	0.90	0.75	1.46	0.75	2.21	1.67	0.11	0.22	0.22	0.22	2.86	1.12	3.98	0.22
New	κw	48.3	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	5.5	1.5	1.1	9.0	0.7	Total	3.7	0.7	Total	3.7	7.3	3.7	Total	8.3	9.0	1.1	1.1	1.1	14.3	5.6	Total	1.1
Total	κW	58.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	9.9	1.8	1.3	0.7	6.0		4.5	6.0		4.5	8.8	4.5		10.0	0.7	1.3	1.3	1.3	17.1	2.9		1.3
ΚW		58.0	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	6.58	06.0	0.67	0.67	06.0		4.49	06.0		4.49	8.78	4.49		10.00	0.67	0.67	0.67	0.67	17.15	6.74		0.67
Mtr	Eff	100%	83%	83%	83%	83%	83%	83%	83%	83%	85%	83%	83%	83%	83%		83%	83%		83%	85%	83%		87.5%	83%	83%	83%	83%	87%	83%		83%
모		•	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	7.50	1.00	0.75	0.75	1.00		5.00	1.00		5.00	10.00	5.00		10.00	0.75	0.75	0.75	0.75	20.00	7.50		0.75
Š.	Ea.	1	2	2	2	2	2	2	2	7	-	2	2	+	-		-	-		-	-	-		1	1	2	2	7	-	-		2
Item to be	Controlled	11 Elec Res Heaters (1)	20 Fan Coil Unit SA Fan	31 Fan Coil Unit SA Fan	52 Fan Coil Unit SA Fan	33 Fan Coil Unit SA Fan	34 Fan Coil Unit SA Fan	55 Fan Coil Unit SA Fan	 			178 Fan Coil Unit SA Fan	32 Fan Coil Unit SA Fan	90 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan	-	97 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		99 Fan Coil Unit SA Fan	10 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		11 HW Circulation Pumps	_	35 Fan Coil Unit SA Fan		37 Fan Coil Unit SA Fan	238 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		240 Fan Coil Unit SA Fan
Building		101	120	161	162	163	164	165	166	167	177	17	182	190			197			8	210	= .=		211	212	235	83	237	23			24

																												, Ţ
SIR	(2)			0.22	0.11	0.11	0.11	0.11	0.05	0.05	0.05	0.11	***		0.57	0.11	0.21	0.77			1.28		4.66	1.07	1.92	1.28	2.23	ho day
Simple	Payback			53.95	107.91	107.91	107.91	107.91	215.82	215.82	215.82	107.91			20.53	107.91	54.53	15.22			9.17		2.51	10.96	60.9	9.17	5.24	Assistant that 600/ as left as division the day and
Invest	\$			\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619			\$2,619	\$2,619	\$2,619	\$2,619			\$2,619		\$2,619	\$2,619	\$2,619	\$2,619	\$10,475	401 020 104
Demand	\$LCC			\$568	\$284	\$284	\$284	\$284	\$142	\$142	\$142	\$284			\$1,492	\$284	\$562	\$2,014			\$3,340		\$12,215	\$2,795	\$5,031	\$3,340	\$23,381	7
Demand	\$/Yr	\$32	\$16	\$49	\$24	\$24	\$24	\$24	\$12	\$12	\$12	\$24	\$79	\$49	\$128	\$24	\$48	\$172	\$237	\$49	\$285		\$1,044	\$239	\$430	\$285	\$1,998	
Demand	kW Saved	0.30	0.15	0.45	0.22	0.22	0.22	0.22	0.11	0.11	0.11	0.22	0.73	0.45	1.18	0.22	0.44	1.59	2.19	0.45	2.64		9.67	2.21	3.98	2.64	18.50	0 1447 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
New	ΚW	1.5	0.7	Total	1.1	1.1	1.1	1.1	9.0	9.0	9.0	1.1	3.7	2.2	Total	1.1	2.2	8.0	11.0	2.2	Total		48.3	Total	Total	Total		
Total	κW	1.8	6.0		1.3	1.3	1.3	1.3	0.7	0.7	0.7	1.3	4.4	2.7		1.3	2.7	9.6	13.2	2.7			58.0					4-4-
₹		1.8	0.90		0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	4.39	2.70		29.0	1.33	4.78	13.16	2.70			58.0					1.11.
M Ft	Eff	83%	83%		83%	83%	83%	83%	83%	83%	83%	83%	82%	83%		83%	•	•	82%	83%			100%					n
웊		2.00	1.00		92'0	0.75	0.75	0.75	0.75	0.75	0.75	0.75	5.00	3.00		0.75	•	•	15.00	3.00		-actors	,					1 - 4 - 4
Š.	Ea.	-	-		2	2	2	7	1	1	-	7	1	-		7	2	7	-	-		ysis I	-					
Item to be	Controlled	Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	HW Circulation Pumps	HW Circulation Pumps	HW Circulation Pumps	Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		Summary of 'Added' Building Analysis Factors	Elec Res Heaters (1)	HVAC Unit SA & RA Fa	HVAC Unit SA & RA Fa	HVAC Unit SA & RA Fa		to had betaland INVI on and abasinal to
Building		241			243	244	246	247	252	256	259	286	287			288	290	291	301			Summary of	101	210	238	301	Total	, C. T.

assumes a 90% room occupancy rate. (The Hacienda is usually filled year-round.) Thus, load is $90 \times .60 \times .90 = 58 \text{ kW}$.

4 OF 5

SHEET

Simple payback period and SIR calculations above do not include added O&M costs; refer to ECIP Analysis Sheet for complete તાં

Life Cycle Cost Analysis Summary ECO B-1 Energy Conservation Investment Program (ECIP) Sheet 5 of 5

•	Fort Hunter Ligg Duty Cycling		Region No. 4			Project No. Fiscal Year	16-403-10 FY96
	ion Name: ECO# i	B-1	_	4.0	VEADO	Droporor: K	ELLED & CANNON
Analysis Date	e: June 1993		Economic Life:	15	YEARS	riepaiei. N	ELLER & GANNON
1. Investmen	t Costs			_			
A. Constructi	on Costs		\$23,710	_			
B. SIOH			\$1,304				
C. Design Co	ost		\$1,423				
	t (1A+1B+1C)		\$26,437	=			
	alue of Existing Eq	uipment					
_	ity Company Reba				\$250		
	stment (1D-1E-1F)					\$26,18	37
 , ,	,						
	vings (+)/Cost(-):			_			
Date of NIST	IR 85-3273-X Used	for Discount Facto	ors				
Energy	Cost	Saving	Annual \$		Discount	Discounted	i
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
oource		2 , (,				40	
A. Elec.	\$21.84		\$0		11.70	. \$0	
B. Dist	\$4.98		\$0		13.78	\$0	
C. Propane	\$7.87		\$0		14.16	. \$0	
D. Other							
E. Demand @	\$108/kW-Yr	130.8	\$14,122		11.70	\$165,2	
F. Total			\$14,122			\$165,2	27
3. Non Energ	y Savings (+) or C	Cost (-):					
				-			
A. Annual Re			(\$667)	-	44.40		
• •	Factor (Table A)				11.12	(A) 7 444	2.
(2) Discounte	ed Savings/Cost (3,	A x 3A1)				(\$7,41)	3)
B. Non Recur	ring Savings (+) o	r Cost (-)					
Item	Savings(+)	Year of	Discount		Doscounted Sav-		
item	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
	0031()(1)	0 00a (2)	, 22.2, (2)				
a.			_	_			
b.			<u>-</u> -	-			
c.							
d. Total							
C Total Non 8	Energy Discounted	Savings (3A2+3B	d4)		(\$7,413)		
4. Simple Pay	/back 1G/(2F3+3A	+(3Bd1/Economic	Life)):		1.9	Years	
	iscounted Savings		,,		\$157,814		
	Investment Ratio (•			6.03		
	nternal Rate of Retu				53.80%		
		` '					

File: F:\PROJ\1640310\ENGR\ECO\LCC-B1A.WQ1

Keller & Gannon

Engineers-Architects

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	FACILITIES	HOLUDED:		
	THOUNTS	HOLUDED:		
		HOLUDED:	770	
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	G-	177	230	
	6.	ברו	230 240	
	d14 d6/47	177	230	
	6. d1A d6/47	177	230 240 281	
	d14 d6/47	177	230 240	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	
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	6. d1A d6/47	177	230 240 281	
	6. d1A d6/47	177	230 240 281	

Keiler & Gannon

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COMPUTED BY KUIS FCO B-?	PROJECT 16-403-10
DATE TTE 1973 SHADE CONDENSIALS TRANSMIT	
REV	SHEET NO. 2 OF 13 SHEETS
····································	
- DAILY SOLAR EITERAY: 1607	BTU /===
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= ACCUMENTED THE SOUTH THE METHON TO	
1607 BTU/FT DAY / 12 112/DAY	: 134 BTUH/
I USE 7=UAST	
UHERE U= 1.64 BTU/HR.PT. = +	
AT = Q/A = 134 PST UH/PT2 U 1.64 PSTU/HZ F	- 82° =
1.64 BTCI/HRZ.F	
THUS STE IS THE COOLING LOAD TEMPER	ZHUIZE DATTIEUTY
SUPETICAZITION FOR CONVECTIVE	L055/25:
C= CON	termet (Geometric)
	OY THERMAL CONDUCTIVITY
Har GR Hpr Har - GR	Assuf #
there Pr	cause #
The over Bry 1054 / 1800	0.25
#=0.0154 BTU (0.54) (1x10"	
-0.26 BTU HZFT =	
<u> </u>	2
- 0.26 x 8t == 21.3 BTUH	
AND EFFECTIVE CLTD - 134-21	1.3 69 FE
1.64	
* SANTA MARIA LIEATIMER DATA FROM:	
PASSIVE SULITE HEATING DESIGN	J.P. BALCOMIS
TY ASING FUNC CHAPT 23.	

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY 1213 FCOFTS-2 PROJECT 10-403-10 CHECKED BY 13H	
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REV	
- ASSUME AN AVERTAGE AMBIET TEMPERATURE	
- OF 85° F. THUS IJITH A 69° F CLTD THE	
SURFITE OF THE LIHIT IS RASED TO A	
TEMPERATURE OF 95 + 69 = 164°F	
- ASSUMIE MY AVERIAE OF 5 CAM /FT2	
= OF SURFICE MEAN OF MR IS HEATED TO_	
= 164°.	
S CFM /FT	
- USIE BITUH = CFM x_4.45 + Wh	
= Uh: BTUH/CFM = 26.8 - 6 BTU/16 = 4.45	
FROM PSYCHROMETRIC CHART THE	
FORTERIAM MIR TEMPERATURE IS PLANSED	
Prom 35° F TO 96° F	
FROM MAN WENCHURERS CATALOG DATA	
FOR AND COULD CHILLERS AND AIR	
COURD TREPRIAFRANT CO-DENSERS THE	
AMPRITATE EFFICIETY IS INCREASIED	
BY 10% WITH A PRUZIENCE IN FIXERING	
AVE TEMPSEATURE FROM 95 1- TO 85° F	

EC0 82 shoet 4 of 13 SENSIBLE HEAT RATIO = Q1 + Q1 1= AVERNAE
2-DESIGN CONDITIONS AMBIEHT MIR DUE TO EXLAR GAIN PSYCHROMETRIC CHARTS + TENTHICAN WE O 1960 HE TRAVE COMPANY, LA CHOSSE WISCONSIN Barometric Pressure 29921 Inches of Mercury GTH = Total cfm × 4.45 × Δh = Btu/hr. KELLER & GANNON Consulting Engineers HEAT GAIN DATA Ent.Air _ R A

Performance Data

Table 16-1 — CGACD18E (180/200-Ton Evap) Performance Data

						Enterina	Condense	Air Temp	erature (C	egrees F)					<u> </u>
LWT		75			85			95			105			115	
(DEG F)	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW_	EER
40	169.6	148.0	11.8	160.3	157.4	10.6	150.4	166.2	9.5	140.0	174.6	8.4	129.0	182.6	7.5
42	175.2	150.2	12.0	165.6	160.0	10.8	155.5	169.2	9.6	144.8	177.8	8.6	133.5	186.4	7.6
44	180.9	152.6	12.3	171.0	162.4	11.0	160.6	172.0	9.8	149.6	181.2	8.7	138.0	190.2	7.7
45	183.8	153.6	124	173.8	163.8	11.1	163.2	173.4	9.9	152.0	183.0	8.8	140.3	192.2	7.8
46	186.7	154.8	12.5	176.5	165.0	11.2	165.8	174.8	10.0	154.5	184.6	8.9	142.6	194.1	7.8
48	192.5	157.0	12.7	182.0	167.4	11.4	171.0	177.8	10.1	159.4	188.0	9.0	147.3	198.4	7.9
50	198.3	159.2	13.0	187.6	170.0	11.6	176.3	180.8	10.3	164.4	191.6	9.1	152.0	202.6	8.0

Table 16-2 — CGACD20E (150-Ton Evap) Performance Data

					Entering	Condense	r Air Temp	erature (D	egrees F)					
	75			85			95			105			115	
TONS		FFR	TONS	KW	EER	TONS	KW	EER	TONS	KW_	EER	TONS	KW	EER
				176.6	10.2	160.1	186.0	9.1	149.2	194.6	8.2	137.7	203.0	7.3
				178.6	10.3	165.3	189.2	9.3	154.1	198.4	8.3	142.3	207.2	7.4
					10.5	170.5	192.6	9.4	159.1	202.2	8.4	146.9	211.6	7.5
						173.2	194.2	9.5	161. 6	204.0	8.5	149.3	213.8	7.5
						175.8	195.8	9.6	164.1	206.0	8.6	151.6	216.2	7.6
						181.2	199.2	9.7	169.1	209.8	8.7	156.4	220.8	7.7
						186.5	202.6	9.9	174.2	213.8	8.8	161.2	225.4	7.8
	TONS 180.0 185.8 191.6 194.5 197.4 203.3 209.3	180.0 166.8 185.8 169.4 191.6 172.0 194.5 173.4 197.4 174.6 203.3 177.2	TONS KW EER 180.0 166.8 11.3 185.8 169.4 11.5 191.6 172.0 11.7 194.5 173.4 11.8 197.4 174.6 11.9 203.3 177.2 12.1	TONS KW EER TONS 180.0 166.8 11.3 170.4 185.8 169.4 11.5 175.8 191.6 172.0 11.7 181.4 194.5 173.4 11.8 184.2 197.4 174.6 11.9 187.0 203.3 177.2 12.1 192.6	TONS KW EER TONS KW 180.0 166.8 11.3 170.4 176.6 185.8 169.4 11.5 175.8 178.6 191.6 172.0 11.7 181.4 182.6 194.5 173.4 11.8 184.2 184.0 197.4 174.6 11.9 187.0 185.4 203.3 177.2 12.1 192.6 188.4	75 85 TONS KW EER TONS KW EER 180.0 166.8 11.3 170.4 176.6 10.2 185.8 169.4 11.5 175.8 178.6 10.3 191.6 172.0 11.7 181.4 182.6 10.5 194.5 173.4 11.8 184.2 184.0 10.6 197.4 174.6 11.9 187.0 185.4 10.7 203.3 177.2 12.1 192.6 188.4 10.9	75 85 TONS KW EER TONS KW EER TONS 180.0 166.8 11.3 170.4 176.6 10.2 160.1 185.8 169.4 11.5 175.8 178.6 10.3 165.3 191.6 172.0 11.7 181.4 182.6 10.5 170.5 194.5 173.4 11.8 184.2 184.0 10.6 173.2 197.4 174.6 11.9 187.0 185.4 10.7 175.8 203.3 177.2 12.1 192.6 188.4 10.9 181.2	75 85 95 TONS KW EER TONS KW EER TONS KW 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 194.5 173.4 11.8 184.2 184.0 10.6 173.2 194.2 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2	75 85 95 TONS KW EER TONS KW EER TONS KW EER 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 9.1 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 9.3 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 9.4 194.5 173.4 11.8 184.2 184.0 10.6 173.2 194.2 9.5 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 9.6 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7	TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS TONS	75 85 95 105 TONS KW EER TONS KW EER TONS KW EER TONS KW 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 9.1 149.2 194.6 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 9.3 154.1 198.4 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 9.4 159.1 202.2 194.5 173.4 11.8 184.2 184.0 10.6 173.2 194.2 9.5 161.6 204.0 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 9.6 164.1 206.0 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7 169.1 209.8	75 85 95 105 TONS KW EER TONS KW EER TONS KW EER TONS KW EER 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 9.1 149.2 194.6 8.2 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 9.3 154.1 198.4 8.3 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 9.4 159.1 202.2 8.4 194.5 173.4 11.8 184.2 184.0 10.8 173.2 194.2 9.5 161.6 204.0 8.5 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 9.6 164.1 206.0 8.6 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7 169.1 209.8 8.7	75 85 95 105 TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 9.1 149.2 194.6 8.2 137.7 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 9.3 154.1 198.4 8.3 142.3 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 9.4 159.1 202.2 8.4 146.9 194.5 173.4 11.8 184.2 184.0 10.6 173.2 194.2 9.5 161.6 204.0 8.5 149.3 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 9.6 164.1 206.0 8.6 151.6 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7 169.1 209.8 8.7 156.4	75 85 95 105 115 TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS KW EER TONS KW 180.0 166.8 11.3 170.4 176.6 10.2 160.1 186.0 9.1 149.2 194.6 8.2 137.7 203.0 185.8 169.4 11.5 175.8 178.6 10.3 165.3 189.2 9.3 154.1 198.4 8.3 142.3 207.2 191.6 172.0 11.7 181.4 182.6 10.5 170.5 192.6 9.4 159.1 202.2 8.4 146.9 211.6 194.5 173.4 11.8 184.2 184.0 10.6 173.2 194.2 9.5 161.6 204.0 8.5 149.3 213.8 197.4 174.6 11.9 187.0 185.4 10.7 175.8 195.8 9.6 164.1 206.0 8.6 151.6 216.2 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7 169.1 209.8 8.7 156.4 220.8 203.3 177.2 12.1 192.6 188.4 10.9 181.2 199.2 9.7 169.1 209.8 8.7 156.4 220.8 203.4 159.1 209.8 8.7 156.4 220.8 203.4

Table 16-3 — CGACD20E (180/200-Ton Evap) Performance Data

						Entering	Condense	r Air Temp	erature (D	egrees F)					
LWT		75			85			95			105			115	
(DEG F)	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER
		170.4	11.6	177.7	180.6	10.4	166.6	190.0	9.3	154.9	199.0	8.3	142.6	207.6	7.4
40	188.1	173.2	11.8	183.4	183.6	10.6	172.1	193.7	9.5	160.0	203.0	8.4	147.4	212.0	7.5
42	194.2			189.3	186.6	10.8	177.6	197.0	9.6	165.2	206.8	8.6	152.3	216.8	7.6
44	1 200.4	176.0	12.0		188.2	10.8	180.4	198.6	9.7	167.9	209.0	8.6	154.7	219.2	7.6
45	203.5	177.4	12.1	192.2		10.9	183.1	200.4	9.8	170.5	211.0	8.7	157.2	221.6	7.7
46	206.6	178.6	12.2	195.2	189.8		188.8	204.0	9.9	175.8	215.2	8.8	162.2	226.4	7.8
48	212.8	181.4	12.4	201.1	192.8	11.1				181.2	219.4	8.9	167.3	231.6	7.8
50	219.1	184.2	12.6	207.1	195. <u>8</u>	11.3	194.4	207.6	10.1	101.2	£13.4	0.3	107.3	201.0	

Notes:

1. Ratings based on sea level stitude and evenorator fouring factor of 0.0005 per ARI 590-81 or 0.00025 per ARI 590-85.

2. Interpotation between points is not permissible.

3. Extrapolation beyond points is not permissible.

4. KW input is for compressors only.

5. EER = Energy Efficiency Ratio, (Blu/west-hour). Power inputs include compressors, condenser fans and control power.

6. Rated in accordance with ARI Standard 590.

7. Ratings are based on an evaporator temperature drop of 10 degrees F.

Performance Data

Table 19-1 - CGAD-C40

						Entering	Condenser	Air Temp	erature (E	Degrees F)					
		75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER
40	36.7	31.6	12.3	34.9	35.0	10.7	33.0	39.0	9.2	31.0	43.4	7.8	28.9	48.2	6.6
42	37.9	32.0	12.6	36.0	35.4	11.0	34.1	39.4	9.4	32.0	43.8 -	8.1	29.9	48.6	6.8
44	39.1	32.2	12.9	37.2	35.8	11.2	35.2	39.6	9.7	33.1	44.0	8.3	31.0	49.0	7.0
45	39.7	32.4	13.1	37.8	35.8	11.4	35.8	39.8	9.8	33.7	44.2	8.4	31.5	49.2	7.1
46	40.4	32.6	13.2	38.4	36.0	11.5	36.4	40.0	9.9	34.3	44.4	8.5	32.0	49.4	7.2
48	41.6	32.8	13.5	39.6	36.4	11.8	37.5	40.4	10.1	35.4	44.8	8.7	33.1	49.8	7.4
50	42.9	33.2	13.8	40.9	36.8	12.0	38.7	40.8	10.4	36.5	45.2	8.9	34.2	50.4	7.6
55	46.2	34.0	14.6	44.0	37.6	12.7	41.8	41.8	11.0	39.5	46.4	9.4	37.1	51.4	8.0
60	49.6	34.8	15.3	47.3	38.4	13.3	45.0	42.6	11.5	42.5	47.4	9.9			

- Note:
 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81 or 0.00025 fouling factor at see level per ARI standard 590-86.
 2. Interpolation between points is permissible.
 3. Extrapolation beyond points is not permissible.

- K. Kw input is for compressors only.
 EER = Energy Efficiency Ratio, (Btu/watt-hourt, Power inputs include compressors, condenser fans and control power.
 Rated in accordance with ARI standard 590.
 Ratings are based on an evaporator temperature drop of 10 F.

Table 19-2 -- CGAD-C50

						Entering	g Condenser	Air Temp	erature (E	Degrees F)					
		75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER
40	46.0	41.6	11.6	43.8	45.8	10.2	41.6	50.6	8.8	39.2	56.0	7.6	36.6	62.2	6.5
42	47.5	42.0	11.9	45.3	46.2	10.4	43.0	51.2	9.0	40.5	56. 6	7.8	37.9	62.6	6.6
44	49.1	42.4	12.2	46.8	46.8	10.7	44.4	51.6	9.3	41.8	57.0	8.0	39.2	63.2	6.8
45	49.8	42.6	12.3	47.5	47.0	10.8	45.1	51.8	9.4	42.5	57.4	8.1	39.9	63.4	6.9
46	50.6	42.B	12.5	48.3	47.2	10.9	45.8	52.2	9.5	43.2	57.6	8.2	40.5	63.8	7.0
48	52.2	43.4	12.7	49.8	47.6	11.2	47.3	52.6	9.7	44.6	58.2	8.4	41.9	`64.2	7.2
50	53.8	43.8	13.0	51.3	48.2	11.4	48.8	53.2	9.9	46.1	58.6	8.6	43.2	64.8 -	7.3
55	57.9	45.0	13.7	55.3	49.4	12.0	52.6	54.4	10.5	49.7	60.0	9.1	46.8	66.2	7.8
60	62.1	46.2	14.3	59.4	50.6	12.6	56.5	55.8	11.0	53.6	61.4	9.5			

- 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81 or 0.00025 fouling factor at see level per ARI standard 590-85.

- Interpolation between points is permissible.
 Extrapolation between points is permissible.
 Extrapolation between points is not permissible.
 Kw input is for compressors only.
 EER = Energy Efficiency Ratio, (Btu/watt-hour), Power inputs include compressors, condenser fans and control power.
 Rated in accordance with ARI standard 590.
 Ratings are based on an evaporator temperature drop of 10 F.

Table 19-3 — CGD-C60

						Entering	g Condenser	Air Temp	erature ([Degrees F)						
		75			85			95			105			115		
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	Ε	ER
40	54.5	48.6	12.0	52.0	53.8	10.5	49.4	59.6	9.0	46.6	66.0	7.8	43.7	73.2	6	6.6
42	56.3	49.2	12.3	53.7	54.4	10.7	51.1	60.2	9.3	48.2	66.8	8.0	45.2	73.8	€	6.8
44 -	58.1	49.6	12.6	55.5	55.0	11.0	52.7	60.8	9.5	49.8	67.4	8.2	46.7	74.4	• 7	7.0
45	59.0	49.8	12.7	56.4	55.2	11.1	53.8	61.2	9.6	· 50.6	67.6	8.3	47.5	74.8	- 7	7.1
46	59.9	50.2	12.8	57.3	55.4	11.2	54.4	61.4	9.7	51.4	68.0	8.4	48.3	75.2	. 7	7.2
48 -	61.8	50.6	13.1	59.1	56.0	11.4	56.2	62.0	9.9	53.1	68.6	8.6	49.9	75.8		7.3
50	63.7	51.2	13.4	60.9	56.6	11.7	57.9	62.6	10.1	54.8	69.2	8.8	51.5	76.4	- 7	7.5
55	68.6	52.6	14.1	65.6	58.0	12.3	62.4	64.2	10.7	59.1	70.8 -	9.2	55.7	78.2	. 7	7.9
60	73.6	53.8	14.8	70.4	59.8	129	67.1	65.8	11.2	63.6	72.6	9.7				_

- Notes:
 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 560-81 or 0.00025 fouling factor at see level per ARI standard 560-85.

- Retrops bessed on a LULLO brokeng tector at sea level per Arti standard 560-51 or LULLO brokeng tector at sea level per /2. Interpolation between points is permissible.
 Kerapolation between points is not permissible.
 Key input is for compressors, (Btu/watt-hour). Power inputs include compressors, condenser fens and control power.
 Rated in accordance with ARI standard 560.
- 7. Ratings are based on an evaporator temperature drop of 10 F.

TABLE 16-1 — System Capacity Data — Air-Cooled Condenser with Compressor Chiller (cont.)

AIR-COOLED	LEAVING			AMBIENT			
CONDENSER COMPRESSOR	CHILLED WATER	85		95	i	105	
CHILLER	TEMPERATURE (F)	TONS	кw	TONS	кw	TONS	kw
00.000	40	73.2	749	66.6	79.1	62.3	83.0
CAUA 800	42	74.1	76.1	69.1	80.4	64.5	84 4
WITH	45	77.5	77.9	72.9	82.2	67.9	86.5
CCUA 080 FI	48	81.4	79.4	76.5	84.0	71.4	88.7
	50	83.7	80.8	78.9	85.6	740	90.5
(2) CAUA	40	119.4	103.1	110.4	110.7	99.4	117.4
800	42	118.1	104.5	110.6	112.3	102.9	119.4
WITH	45	123.8	106.6	116.0	114.8	108.0	122.3
CCUA 120 R	48	129.3	108.7	121.4	117.1	113.2	125.0
CCOA 120 N	50	133.1	110.0	125.2	118.6	116.8	126.8
(2) CAUA	40	134.6	129.3	124.7	137.3	115.7	145.6
800	42	139.0	131.6	129.0	140.0	120.0	148.0
WITH	45	145.6	134.2	135.4	144.0	126.4	151.6
CCUA 150 E	48	153.0	139.8	142.2	147.6	132.8	156.0
COA 130 E	50	157.5	140.6	147.0	149.9	137.2	154.3
(1) CAUA	40	156.0	150.8	141.5	160.0	133.8	168.5
800 AND	42	161.3	153.3	150.1	162.8	138.7	171.6
(1) CAUA	45	169.3	157.1	157.6	167.0	146.1	176.3
1000 WITH	48	178.0	161.0	165.5	171.3	153.7	181.5
CCUA 180 E	50	183.4	163.3	170.8	172.8	158.6	184.1
CCOX 180 E	- 40	69.3	61.7	64.3	66.5	59.3	70.3
CAUA 1000	42	71.6	62.8	66.6	67.5	61.6	71.6
WITH	45	75.1	64.5	70.1	69.0	65.1	73.5
CCUA 075 E	48	77.8	65.3	73.7	70.3	68.4	75.0
OCCA SISE	50	81.1	66.4	76.2	71.4	70.8	76.2
	40	74.0	72.1	69.3	76.9	64.2	80.8
CAUA 1000	42	76.3	73.2	71.6	77.8	66.7	82.0
WITH	45	79.7	75.0	75.1	79.2	70.5	83.7
CCUA 080 R	48	82.2	76.7	79.1	80.8	74.2	85.6
355775557	50	86.1	77.9	81.4	82.2	76.8	87.3
	40	88.7	85.9	82.7	91.3	76.2	95.7
CAUA 1000	42	91.8	87.5	85.6	92.8	78.9	96.6
WITH	45	96.5	90.0	89.9	95.0	82.9	100.5
CCUA 100 E	48	101.5	92.0	94.4	97.5	87.3	103.2
	50	104.6	93.3	97.3	99.2	90.0	105.1
-	40	89.9	89.1	83.9	94.2	77.8	98.7
CAUA 1000	42	92.9	90.5	86.8	95.6	80.6	100.2
WITH	45	97.6	92.3	91.3	97.8	84.8	102.8
CCUA 100 R		102.3	94.3	95.9	99.9	89.3	105.5
1	50	105.5	95.5	99.0	101.3	92.4	106.8
(2) CAUA	40	138.7	123.3	128.5	132.0	118.7	140.7
1 (2,0,00	42	143.2	125.6	133.2	135.0	123.2	143.8
1000			1				1
1000 WITH	45	150.2	129.0	140.2	138.0	130.2	147.0
1000 WITH CCUA 150 E		150.2 155.6	129.0		140.6	130.2	150.0

TABLE 16-1 — System Capacity Data — Air-Cooled Condenser with Compressor Chiller (cont.)

AIR-COOLED	LEAVING			AMBIEN RING CO			
CONDENSER COMPRESSOR	CHILLED WATER	8	5	9:	5	10	5
CHILLER	TEMPERATURE (F)	TONS	кw	TONS	кw	TONS	кw
(1) CAUA	40	159.0	145.2	145 5	155.5	133 9	165 5
1000 AND	42	165 1	147 8	153 7	158.2	1416	167 0
(1) CAUA	45	1743	151 7	166 0	162.3	153.1	172.3
1200 WITH	48	181 3	154.0	170 4	165 3	156 6	176 4
CCUA 180 E	50	187.7	156 5	175.7	167 4	162.2	178 5
(2) CAUA	40	177.3	171 7	165.5	182.7	152.5	191 3
1000	42	183.6	1750	171 2	185 6	1578	196.6
WITH	45	196.0	180 6	179.8	170 0	165 8	201 0
CCUA 200 E	48	205.9	184 0	188 4	193 0	175 6	206 4
	50	209.3	186.7	194 7	198.3	180 4	210 1
	40	89 7	83.5	83.5	89 0	77 0	94 1
CAUA 1200	12	93.5	85 0	87 1	90.7	80 0	96 0
WITH	45	99 2	87 2	92 5	93.3	84 5	98 8
CCUA 100 E	48	103.5	88 7	96.5	95 0	88.2	101 0
	50	106.6	90.0	99 5	96 0	914	102.3
	40	92.7	86 8	86 4	92.2	80.2	97 1
CAUA 1200	42	95.8	88.0	89.6	93.6	83.2	98.6
WITH	45	100.7	89.8	94 1	95.6	87 7	100.9
CCUA 100 R	48	105.9	915	99 1	97.5	92.3	103 1
	50	109 1	92.5	102.4	98.8	95.4	104 5
	40	1110	108.0	103.8	1148	96.5	121 3
CAUA 1200	42	114.4	109.7	107 1	116.8	99.7	123.4
WITH	45	119.6	112.3	112.2	119.7	104.5	126 7
CCUA 120 R	48	125.0	114.8	117.3	122.6	109.3	129.8
	50	128.6	116.4	120 6	124 4	1127	131 8
(2) CAUA	40	179.4	165.6	157.0	177.9	154.0	188.3
1200	42	187.0	170 0	174 2	181 4	160 0	192.0
WITH	45	198 4	174 4	185 0	186.6	168.0	197 6
CCUA 200 E	18	212.4	188.0	1976	200.0	182 8	202.0
	50	213 1	180.1	199.0	192.0	182.8	204.7

NOTES:

NOTES:
(1) Kw is for compressor only.
(2) Capacities are at a 10 F At.

⁽¹⁾ Kw is for compressor only.(2) Capacities are at a 10 F Δt.

Cooling System Energy	Savings	Energy	Building	Cooling System Energy	Savings	Energy
After Previous ECO's (RWH/Yr	@10%	Svg \$/Y	l.	After Previous ECO's (kWH/	@10%	Svg \$/Yr
5,818	512	\$38	186	5,480	482	\$36
10,925	961	\$72	508	49,146	4,325	\$323
7,726	680	\$51	207	75,188	6,617	\$494
7,726	980	\$51	208	79,324	6,981	\$521
12,694	1,117	\$83	209	36,698	3,229	\$241
7,726	680	\$51	210	25,095	2,208	\$165
4,800	430	\$32	212	12,278	1,080	\$81
9,488	835	\$62	229	79,326	6,981	\$521
5,265	463	\$35	230	79,326	6,981	\$521
999'9	286	\$44	240	926'8	786	\$59
3,672	341	\$25	287	18,628	1,639	\$122
5,672	341	\$25	290	11,806	1,039	\$77
10,800	996	\$71	291	7,313	644	\$48
12,405	1,092	\$81	295	150,203	13,218	\$986
3,120	275	\$20	301	029'22	1,991	\$148

ECO-2 Energy Bavings

ECO-2 Energy Savings

Building	Construction Cost	Units	No.	Labor	Total	Material	Total	Total cost
6	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
41a	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
l	TOTAL							\$986
46	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
47	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
51a	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
- V	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
54	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
80	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,444
	Wood Column	LF	40	\$7	\$277	\$6	\$252	\$529
	TOTAL							\$1,973
81	Wood Screeen	sf	400	\$1	\$536	\$6	\$2,352	\$2,888
	Wood Column	LF	80	\$7	\$554	\$6	\$503	\$1,058
	TOTAL							\$3,946
131	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
149	Wood Screeen	sf	150	\$1	\$201	\$6	\$882	\$1,083
	Wood Column	LF	50	\$7	\$347	\$6	\$315	\$661
	TOTAL							\$1,744
161	Wood Screeen	sf ·	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
162	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
177	Wood Screeen	sf »	250	\$1	\$335	\$6	\$1,470	\$1,805

ECO B2 Sheet 10 of 13

ECO-2 Energy Savings

	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL							\$2,202
178	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
182	Wood Screeen	sf	800	\$1	\$1,072	\$6	\$4,704	\$5,776
	Wood Column	LF	60	\$7	\$416	\$6	\$377	\$790
	TOTAL							\$6,56
186	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$72
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$26
	TOTAL							\$98
206	Wood Screeen	sf	250	\$1	\$335	\$6	\$1,470	\$1,80
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$26
	TOTAL							\$2,06
207	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,22
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,32
	TOTAL							\$8,54
208	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,22
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,32
	TOTAL							\$8,54
209	Wood Screeen	sf	400	\$1	\$536	\$6	\$2,352	\$2,88
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$39
	TOTAL							\$3,28
210	Wood Screeen	sf	500	\$1	\$670	\$6	\$2,940	\$3,61
	Wood Column	LF	40	\$7	\$277	\$6	\$252	\$52
	TOTAL							\$4,13
212	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,44
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL		1					\$1,84
229	Wood Screeen	sf -	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,32
	TOTAL		1					\$8,542
230	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL		1					\$8,542
240	Wood Screeen	sf	600	\$1	\$804	\$6	\$3,528	\$4,332
***************************************	Wood Column	LF	50	\$7	\$347	\$6	\$315	\$661
	TOTAL							\$4,993

ECO-2 Energy Savings

287	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,444
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL							\$1,841
290	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
291	Wood Screeen	sf	100	\$1	\$134	\$ 6	\$189 \$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
295	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL							\$8,542
301	Wood Screen	sf	2000	\$1	\$2,680	\$6	\$11,760	\$14,440
	Wood Column	LF	250	\$7	\$1,733	\$6	\$1,573	\$3,305
	TOTAL							\$17,745

7						1.20	(1) 2.0	1001	*			
,	0.157	78.6	\$29,483	\$2,386	\$59,474	\$5,083	*******	***	\$187,625	\$168,273	\$107,878	Total
	(0.104)	(104.6)	(\$3,196)	(\$295)	\$1,737	\$148	(\$4,933)	(\$444)	\$30,863	\$27,679	\$17,745	30
T	0.617	19.2	\$9,161	\$772	\$11,535	\$986	(\$2,375)	(\$214)	\$14,856	\$13,324	\$8,542	282
	0.168	73.5	\$287	\$23	\$562	\$ 48	(\$274)	(\$25)	\$1,718	\$1,539	8986	291
	0.369	32.5	\$632	\$53	\$907	21.1	(\$274)	(\$25)	\$1,718	\$1,539	\$986	82
	0.287	42.0	\$919	\$78	\$1,431	\$122	(\$512)	(\$46)	\$3,201	\$2,871	\$1,041	287
	(0.081)	(131.2)	(\$702)	(\$88)	\$686	\$ 28	(\$1,388)	(\$125)	\$8,684	\$7,788	\$4,983	240
_	0.250	48.4	\$3,717	\$307	\$6,092	\$521	(\$2,375)	(\$214)	\$14,856	\$13,324	\$8,542	230
	0.250	48.4	\$3,717	\$307	\$6,092	\$521	(\$2,375)	(\$214)	\$14,856	\$13,324	\$8,542	229
	0.135	95.6	\$431	\$35	\$943	\$81	(\$512)	(\$46)	\$3,201	\$2,871	\$1,841	212
_	0.108	117.5	\$777	\$61	\$1,927	\$165	(\$1,151)	(\$103)	\$7,198	\$6,458	\$4,139	210
	0.334	38.0	\$1,905	\$159	\$2,818	\$241	(\$913)	(\$82)	\$5,713	\$5,123	\$3,285	8
	0.250	48.4	\$3,717	\$307	\$6,092	\$521	(\$2,375)	(\$214)	\$14,856	\$13,324	\$8,542	208
	0.229	53.1	\$3,400	\$280	\$5,774	za	(\$2,375)	(\$214)	\$14,856	\$13,324	\$8,542	207
	0.889	13.3	\$3,199	\$271	\$3,774	\$323	(\$575)	(\$52)	\$3,599	\$3,228	\$2,069	208
	0.085	151.7	\$147	\$11	\$421	\$38	(\$274)	(\$25)	\$1,718	\$1,539	\$986	186
_	(0.139)	(79.5)	(\$1,587)	(\$144)	\$240	\$20	(\$1,826)	(\$164)	\$11,425	\$10,247	\$8,569	182
	0.395	30.2	\$678	\$57	\$953	183	(\$274)	(\$25)	\$1,718	\$1,539	\$986	178
	0.058	234.9	\$223	\$18	\$835	178	(\$812)	(\$55)	\$3,829	\$3,434	\$2,202	177
_	0.013	2271	\$23	55	\$297	\$25	(\$274)	(\$25)	\$1,716	\$1,539	\$986	162
_	0.013	2271	\$23	55	\$297	\$25	(\$274)	(\$25)	\$1,716	\$1,539	\$986	161
_	0.009	35169	\$26	8	\$511	74	(\$485)	(\$44)	\$3,033	\$2,720	\$1,744	149
_	0.076	173.3	\$130	\$10	\$404	\$35	(\$274)	(\$25)	\$1,718	\$1,539	\$986	131
_	(0.054)	(188.7)	(\$368)	(\$36)	\$729	\$ 85	(\$1,097)	(66\$)	\$6,862	\$6,155	\$3,946	5
	(0.050)	(189.2)	(\$173)	(\$17)	\$376	\$32	(\$548)	(\$48)	\$3,431	\$3,077	\$1,973	8
	0.186	62.9	\$319	\$28	\$593	\$51	(\$274)	(\$25)	\$1,718	\$1,539	\$986	2
_	0.408	29.2	\$701	\$59	\$975	883	(\$274)	(\$25)	\$1,718	\$1,539	986\$	51A
	0.186	65.9	\$319	\$26	\$593	153	(\$274)	(\$25)	\$1,718	\$1,539	986\$	47
	0.186	65.9	\$319	\$26	\$593	153	(\$274)	(\$25)	\$1,718	\$1,539	\$986	46
,	0.329	36.5	\$565	547	\$839	\$72	(\$274)	(\$25)	\$1,716	\$1,539	\$88\$	414
_	0.101	126.8	\$173	\$14	\$447	823	(\$274)	(\$25)	\$1,718	\$1,539	986\$	9
		Years	\$ CC	Total \$/Yr	207	Svg/Yr	\$CC	Saved	Total	Total		
_	SIB	Pavback	Savings	Savings	Energy	Energy	O&M	O&M/YR	Investment	Construction Investment O&M/YR	Bare Cost	Building

(\$3697) (\$29,990)

O&M/YR.......Vearly maintenance scheduled as 2.5% of installed cost Construction Cost....Installed Cost

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30%

Bond.....1%

Contingency......Estimators contingency 10%

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ECO B2 Energy Savings

Life Cycle Cost Analysis Summary ECO B2 Energy Conservation Investment Program (ECIP) Sheet 13 to 13

•		er HVAC Condensers	Region No. 4			Project No. 16-403-10 Fiscal Year FY96	
	ion Name: ECO# e: March 1993	B-2	Economic Life:	15	YEARS	Preparer: KELLER & G	ANNON
1. Investmen	t Costs						
A. Constructi	on Costs		\$168,273	-			
B. SIOH			\$9,255	-			
C. Design Co	ost		\$10,096	-			
•	(1A+1B+1C)		\$187,624	-			
	alue of Existing E	quipment			\$0		
	ity Company Reb				\$0		
G. Total Inve	stment (1D-1E-1F))			-	\$187,624	
2. Energy Sa	vings (+)/Cost(-):						
		d for Discount Factors		-			
Energy	Cost	Saving	Annual \$		Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
000,00	4 /	11.010, 11.(2)					
A. Elec.	\$18.23	279	\$ 5, 0 63		11.70	\$59,471	
B. Dist	\$4.98	0	\$0 =		13.78	\$0 =	
C. Propane	\$7.87	. 0	\$0 🗇		14.16	\$0 -	
D. Other							
E. Demand S	avings						
F. Total			\$5,083	•		\$59,471	
3. Non Energ	y Savings (+) or	Cost (-):	<u> </u>	-			
A. Annual Re	curring (+/-)		(\$2,697)				
	Factor (Table A)		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	-	11.12		
	d Savings/Cost (3	3A x 3A1)		,	 	(\$29,991)	
B. Non Recur	ring Savings (+)	or Cost (-)					
ltem	Savings(+)	Year of	Discount		Doscounted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						· ·
a.			- -			•	
b. -		-					
C.				:			
d. Total							
C Total Non E	Energy Discounted	d Savings (3A2+3Bd4))		(\$29,991)		
4. Simple Pay	back 1G/(2F3+3/	A+(3Bd1/Economic Li	ife)):		78.6	Years	
	iscounted Saving	· · · · ·	·		\$29,480		
	Investment Ratio	•			0.16		
	iternal Rate of Ref				-9.60%		

Keller & Gannon
Engineers-Architects

COMPUTED BY BIH	£0 B3	PROJECT 16 403 -10 FH4 - ZEAP
CHECKED BY	INSULATE DUCTWORK	SHEET NOOF SHEETS

DESCRIPTION OF ACTION

Insulate ductwork exposed to the ambient. Existing ductwork is either not insulated, or has deteriorated insulation, making it ineffective.

BUILDINGS INCLUDED.

127 INSULATE FURNACE CASING ABOUT FIREBOX
146 INSULATE 305F OF SA DUCT OUTSIDE HTG ONLY 50-160

ENERRY SAVING CALCULATIONS

BLOG 127 FURNACE CASING AREA: ~45 SF TEMP OF CASING ~ 140°F INHECHTIM BLOG 146 30SF DUCT -HEATING ONLY 120°F OUTSIDE

BLDG AT

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BLUG 127: 45 SF x 22 = 990 BTOH x 1364 Full load bys = 1.35 Hil BTO/Y

BLUG 146: 305F x 22 = 330 BTOH x 281 Full Load bys = 0.092 Hil BTO/Y

DIVIDING BY WAF 7'S = 3:31 (-5-17)

BLUG 127 = 1.35/0.64 = 111 Hil BTO/Y r / 1000x

BLOG 146 = 0.092/0.62 = 0.15 Mil BTUly Propers

Σ	Keller	&	Gannon
	Enginee	ers-	-Architects

COMPUTED BY BIH		PROJECT 16-403-10
	ECO 83	FHL-EEAP
CHECKED BY		
DATE HARCH 1992	INSULATE DUCTWORK	
BEV 1000 & 1993		SHEET NO. 2 OF 6 SHEETS

	BLOG 127	BCD6 146
PROPANE SAUED	5.17 Hil Btu/yr	0.15 HIBTUlar
COST SAUZD	40.68 # 16.61 /YR	# 1.18 /YR
CC SAUED,	\$ 235 576.02	# 16,67
N=154R, UPW= 14.16		

Refer to Cost estimates and LCC Analyses on Coilowing sheets.

NO Additional OSM costs assumed

AIR LEAKAGE CONSIDERATIONS

for losses of about 10% or higher.

Insulating Lectwork, including retaping of Luctwork joints don reduce such losses by as much as so to.

The two buildings evaluated for this ECO do not qualify for such savings like to insulation installation aloxe) as the dectwork in building 146 is only exposed outside (305F) and the SA Luctwork runs suiside the conditional space of this shop building. The insulation vetro fit for building 127 addresses only the boiler, not dectwork,

Leakage from HVAC Luctwork con account

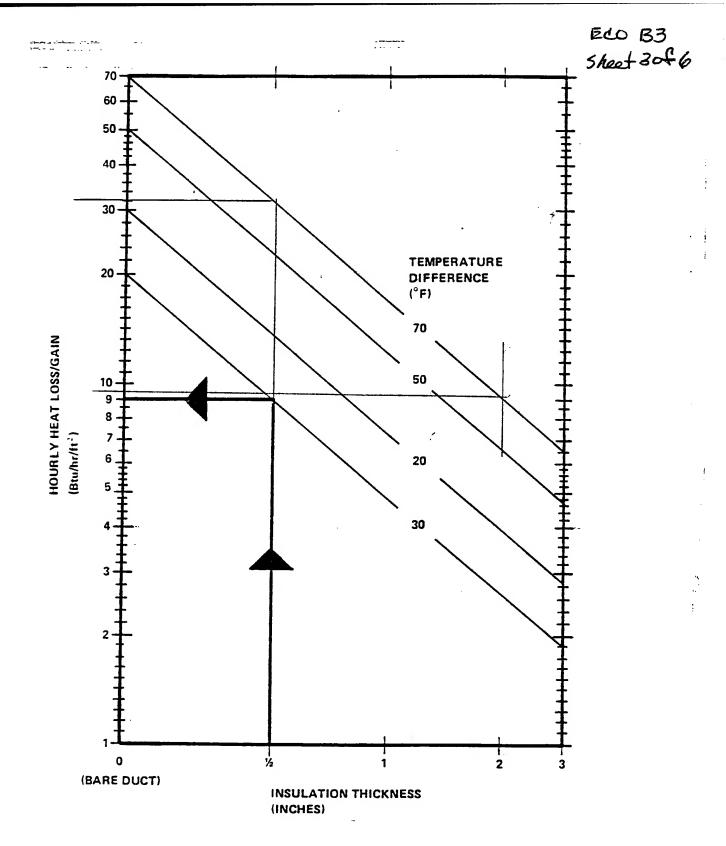


FIGURE 8-46. DUCT INSULATION-HEAT LOSS/GAIN FOR VARIOUS THICKNESS

				Date Prepared		Sheet C)F
CONSTRUCTION COST ES	TIMAT	E		February	1993	4	6
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10]		
Location					Code A	(no design compe	ited)
Fort Hunter-Liggett, California							
Engineer-Architect Keller & Gannon							
Drawing No.		Estimator			Checked	Ву	
ECO-B3 Insulate Ductwork		RJB			він		
		antity		abor		Aaterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 127							
2-inch Thick Insulation - FG	45	SF	1.92	\$87	1.20	\$54	\$141
Weatherproof, Non-metallic	45	SF	5.80	\$261	3.48	\$156	\$417
Subtotal Building 127							\$558
Sales Tax 8%							\$45
Contractor O.H. & P 30%							\$45
Sub Total	**						\$647
Bond 1%							\$6
Sub Total							\$654
Estimating Contingency 10%							\$65
Total Probable Construction Cost							\$719
Building 146							
2-inch Thick Insulation - FG	30	SF	1.92	\$58	1.20	\$36	\$94
Weatherproof, Non-metallic	30	SF	5.80	\$174	3.48	\$104	\$278
Subtotal Building 146							\$372
Sales Tax 8%	1						\$30
Contractor O.H. & P 30%					İ		\$30
Sub Total							\$432
Bond 1%							\$4
Sub Total							\$436
Estimating Contingency 10%							\$44
Total Probable Construction Cost							\$479

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Life Cycle Cost Analysis Summary ECO B3 Energy Conservation Investment Program (ECIP) Sheet 5 fo 6

	Fort Hunter Ligge Insulate Ductwork, on Name: ECO# B	Building 127	Region No. 4			Project No. 16-40 Fiscal Year FY9
Analysis Date:		-3	Economic Life:	15	YEARS	Preparer: KELLE
1. Investment			\$719	_		
A. Construction	on Costs			_		
B. SIOH			\$40	-		
C. Design Cos			\$43	=		
D. Total Cost	-		\$802		¢ο	
_	lue of Existing Equ				\$0	_
	y Company Rebate)			\$0	
G. Total Inves	tment (1D-1E-1F)					\$802
2 Energy Say	rings (+)/Cost(-):					
	R 85-3273-X Used f	or Discount Factors	S	-		
F	Cost	Saving	Annual \$		Discount	Discounted
Energy	Cost	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
Source	\$/MTBU/(1)	MBTO/TH(2)				
A. Elec.	\$18.23	0	\$0		11.70	. \$0
B. Dist	\$4.98	0	\$0		13.78	\$0
C. Propane	\$7.87	5.2	\$41		14.16	\$576
D. Other						_
E. Demand Sa	avings			_		
F. Total			\$41	=		\$576
3. Non Energy	y Savings (+) or Co	ost (-):		_		
A. Annual Red	curring (+/-)		\$0	_		
(1) Discount F	actor (Table A)				11.12	•
(2) Discounted	d Savings/Cost (3A	x 3A1)				\$0
B. Non Recuri	ring Savings (+) or	Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.						
b.			-			
c.				=		:
d. Total						
C Total Non E	inergy Discounted	Savings (3A2+3Bd	4)		\$0	
4. Simple Pav	back 1G/(2F3+3A-	+(3Bd1/Economic i	Life)):		19.7	Years
	iscounted Savings				\$576	
	Investment Ratio (S				0.72	
	ternal Rate of Retu				Negative	

File: F\PROJ\1640310\ENGR\ECO\LCC-B3A.WQ1

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 6 to 6

ECO B3

Location:	Fort Hunter Ligge	et California	Region No. 4			Project No.	16-40
	nsulate Ductwork,		110010111101			Fiscal Year	FY96
-	on Name: ECO# B						
Analysis Date:			Economic Life:	15	YEARS	Preparer: Ki	ELLER
, individuo							
1. Investment	Costs			_			
A. Construction	n Costs		\$479	_			
B. SIOH			\$26	_			
C. Design Cos	it		\$29	_			
D. Total Cost	(1A+1B+1C)		\$535				
E. Salvage Va	lue of Existing Equ	uipment			\$0	_	
F. Public Utilit	y Company Rebate	•			\$0		
G. Total Inves	tment (1D-1E-1F)					\$535	i
٥	: (.) (O4() .						
	ings (+)/Cost(-):	for Discount Facto		-			
Date of MISTI	1 65-32/3-X U860	for Discount Pactor	•				
Energy	Cost	Saving	Annual \$		Discount	Discounted	l
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$18.23	0	\$0		11.70	\$0	
B. Dist	\$4.98	0	\$ 0		13.78	\$0	
C. Propane	\$7.87	0.15	\$ 1		14.16	\$17	
D. Other			_				
E. Demand Sa	vings			_			
F. Total			\$1	-		\$17	
3. Non Energy	Savings (+) or Co	ost (-):		-			
A. Annual Rec	urring (+/-)		\$0				
	actor (Table A)			-	11.12		
• •	Savings/Cost (3A	\ x 3A1)				\$ 0	
	•	ŕ					
B. Non Recurr	ing Savings (+) or	Cost (-)					
Item	Savings(+)	Year of	Discount		Doscounted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
_				-			
a.			-			•	
b. c.			-			•	
d. Total			-			•	
d. Total							
C Total Non E	nergy Discounted	Savings (3A2+3Bc	14)		\$0		
4. Simple Pavi	back 1G/(2F3+3A	+ (3Bd1/Economic	Life)):		452.9	Years	
	iscounted Savings	•			\$17		
	investment Ratio (0.03		
_	ternal Rate of Retu	•			Negative		

Keller & Gannon

Engineers-Architects

COMPUTED BY RUB	ECO" B-4	PROJECT 16-403-10
CHECKED BY 51H	We was Rose Transfer	
DATE MAD (4) 19-13	145CICHTE ITTO	SHEET NO OF 20_ SHEETS
REV. JUNE 1993	PENEUT TESURIPHON	STILL NO OF OTEL:0

	»			
	DESCRIPTO	I OF ACTION	Amm	
-	STEAM, HO	TLAMER, COHDENS	HE MO C	HUED
-		PAHE FOR HUAR		
	15 HOT 1H	SULITED LINE	INSUL	MED.
-		REPRICE UHLAN		
*	III ATO OU	TOF THE LURIC	un Funos	ンゴナン
	THUL 1140	TOEKSE WERLITCH	HEATHER !	ンキュ
 -	COOLHG	FRUEHCY		
	FACILITIE	5 litempter		
	BUDG			
	6	206	238	
-	80	207	241	
	8_1	208	287	
	124	209	290	
<u>-</u>	127	212	291	
·	13-1	219		
	190	229		
	197	230		

ECO B-4 INSULATE HW PIPING (Revised June 1993)

																		-	Savings to	Invest	Ratio	2.08	0.57	1.43	8.60	2.01	2.01	2.26	4.45	2.01	2.01	2.04	2.14	0.83	7.22	2.40
Savings to	Invest	Ratio	3.11	0.30	1.91	3.12	2.15	2.15	3.31	3.45	2.15	2.15	3.03	2.27	0.74	8.45	2.48		Investment		₩	\$671	\$305	\$197	\$186	\$312	\$312	\$ 131	\$134	\$312	\$312	\$134	\$302	\$568	\$149	\$3,786
Investment		"	\$ 391	\$243	\$117	\$467	\$243	\$243	\$78	\$157	\$243	\$243	\$78	\$243	*	\$122	\$3,115		Construction	Cost	*	\$602	\$274	\$176	\$167	\$280	\$280	\$118	\$120	\$280	\$280	\$120	\$274	\$208	\$134	\$3,378
Construction	Cost	**	\$351	\$218	\$105	\$419	\$218	\$218	\$70	\$140	\$218	\$218	\$70	\$218	\$359	\$109	\$2,794		Bare	Š	**	\$386	\$175	\$113	\$107	\$179	\$178	\$75	\$77	\$179	\$179	\$77	\$176	\$326	\$88	\$2,166
Bare	Cost	*	\$22\$	\$140	\$68	\$268	\$140	\$140	\$45	06\$	\$140	\$140	\$45	\$140	\$230	\$70	\$1,791		Total	LCC Save	43	\$1,406	\$175	\$281	\$1,597	\$626	\$626	\$296	\$298	\$626	\$626	\$275	\$654	\$471	\$1,079	\$8,038
Total	LCC Saved	*	\$1,217	\$73	\$225	\$1,455	\$523	\$523	\$228	\$540	\$523	\$523	\$237	\$552	\$294	\$1,028	\$7,750		Single	Year (#10)	\$ Saved	\$225	\$102	\$88	\$62	\$105	\$105	\$44	\$45	\$105	\$105	\$45	\$102	\$190	\$50	\$1,262
ပ္	_		\$1,315	\$134	\$254	\$1,571	\$583	\$583	\$279	\$218	\$583	\$583	\$256	\$613	\$ 384	\$1,059	\$8,527		3	Energy	**	\$1,315	\$134	\$254	\$1,571	\$583	\$583	\$279	\$578	\$583	\$583	\$256	\$613	\$384	\$1,059	\$8,527
O&M Cost	Saved	\$ / \$	(\$8.77)	(\$5.46)	(\$2.63)	(\$10.47)	(\$5.46)	(\$5.48)	(\$1.75)	(\$3.51)	(\$5.46)	(\$5.46)	(\$1.75)	(\$5.46)	(\$8.97)	(\$2.73)	(\$69.84)		O&M Cost	Saved	\$ /⊀	(\$12.04)	(\$5.47)	(\$3.53)	(\$3.33)	(\$5.60)	(\$5.60)	(\$2.35)	(\$2.41)	(\$5.80)	(\$5.60)	(\$2.41)	(\$5.48)	(\$10.18)	(\$2.68)	(\$67.56)
Total (Energy	\$/¥	\$92.87	\$9.44	\$18.43	\$114.04	\$42.33	\$42.33	\$19.68	\$40.92	\$42.33	\$42.33	\$18.10	\$43.46	\$28.21	\$74.77	\$610.48		Total	Energy	\$ \	\$92.87	\$9.44	\$18.43	\$114.04	\$42.33	\$42.33	\$19.68	\$40.92	\$42.33	\$42.33	\$18.10	\$43.46	\$28.21	\$74.77	\$610.46
	ō	\$/4	\$0.00	\$0.00	\$18.43	\$114.04	\$42.33	\$42.33	\$0.00	\$0.00	\$42.33	\$42.33	\$0.00	\$0.00	\$0.00	\$0.00	\$301.79			ō	\$/X	\$0.00	\$0.00	\$18.43	\$114.04	\$42.33	\$42.33	\$0.00	\$0.00	\$42.33	\$42.33	\$0.00	\$0.00	\$0.00	\$0.00	\$301.79
8	Propane	\$ /∡c	\$92.87	\$9.44	\$0.00	\$0.00	\$0.00	\$0.00	\$19.68	\$40.92	\$0.00	\$0.00	\$18.10	\$42.50	\$25.97	\$74.77	\$307.72		8	Propane	¥.	\$92.87	\$9.44	\$0.00	\$0.00	\$0.00	\$0.00	\$19.68	\$40.92	\$0.00	\$0.00	\$18.10	\$42.50	\$25.97	\$74.77	\$307.72
Cost Savings	Electric	\$ ∕∡	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.96	\$2.24	\$0.00	\$0.98		Cost Savings	Electric	\$/⊀r	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.98	\$2.24	\$0.00	\$0.98
Ū	ō	MBTU/Yr	0.00	0.00	3.70	22.90	8.50	8.50	0.00	0.00	8.50	8.50	0.00	0.00	0.00	0.00	60.60	NOIL		ō	MBTU/Yr	0.00	0.00	3.70	22.90	8.50	8.50	0.00	0.00	8.50	8.50	0.00	0.00	0.00	0.00	60.60
	Propane		11.80	1.20	0.00	0.00	0.00	0.00	2.50	5.20	0.00	0.00	2.30	5.40	3.30	9.50	39.10	WITH REMOVABLE TYPE INSULATION		Propane		11.80	1.20	0.00	0.00	0.00	0.00	2.50	5.20	0.00	0.00	2.30	5.40	3.30	9.50	39.10
Savings	Electric		0.00	0.00	0.00	0.00	0.00	00.0	0.00	0.00	0.00	0.00	0.00	15.40	36.00	00.0	15.40	CT E INANC	Savings	Electric	KWHr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.40	36.00	0.00	15.40
Savings	Building		80	18	190	206	207	208	508	219	229	230	238	241	290	291	SIR > 1	WITH REM		Building		80	8	180	208	207	208	209	219	229	230	238	241	280	291	SIR > 1

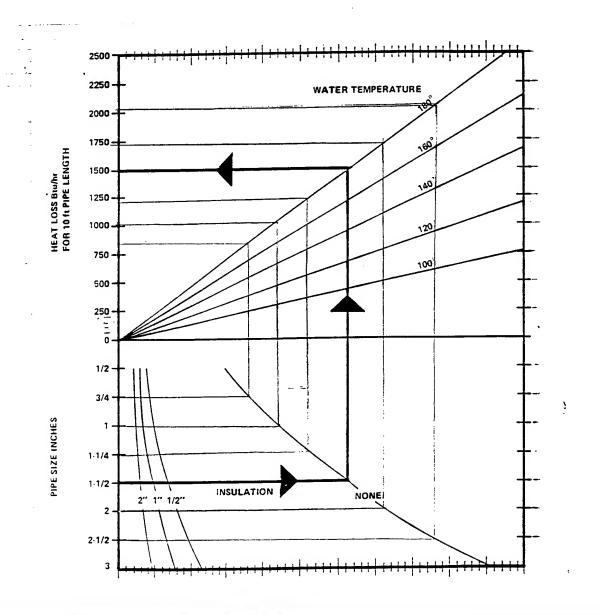
Engineers-Architects

COMPUTED BY 12JB	ECO* B-4	PROJECT 16-403-10
CHECKED BY SINT 1993	INSTANTE PIPE FITTINGS	
REV. JUNE 1993	HEATLOSSIGAN CALLULTONS	SHEET NO. 3 OF 30 SHEETS

HET LATER HEATHA 190° SUPPLY / 170° RETURN => 180° AVE USE POE" EHERAY CONSEIRMATION

14 EXISTING BUILDINGS P14. 8-47"

INSULATION



Keller & Gannon

Engineers-Architects

COMPUTED BY RUB TO THE PRE FITTING SHEET NO. 4 OF 20 SHEETS

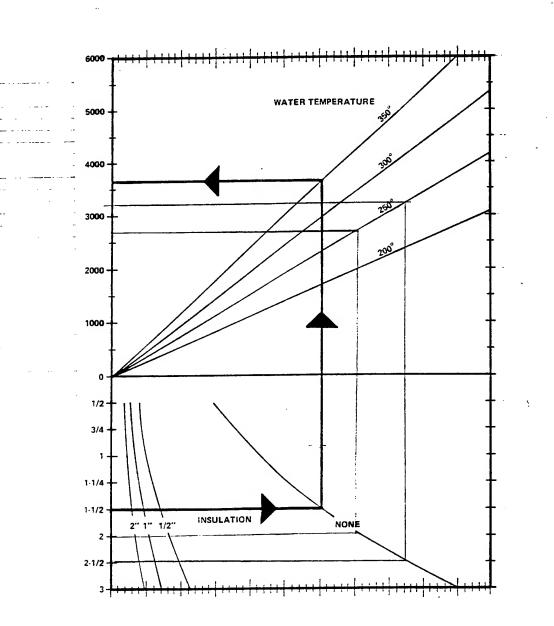
ASSUMPTIOHS
STEAM HEATTHA

STEAM HEATHY

LIST DOTE" EHTERY CONSTROY IH

EXISTHA BUILDIHAS FIA. 8-48

ASSUME I" IHSULATION



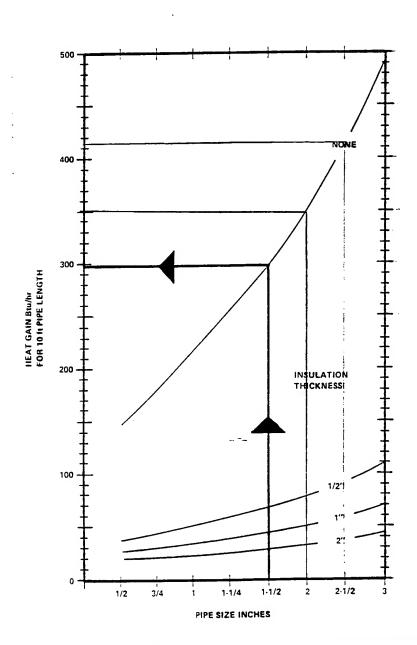
Keller & Gannon

Engineers-Architects

COMPUTED BY EUTS	1	PROJECT 16-403-10
OUTOVED BY 721H	360 5	FIT ETH
DATE MARCH 1973	HISHLATE PIPET FITTINGS	SHEET NO. 5 OF 20 SHEETS
REV. <u> </u>	HEAT LOSSIGNH CALCULATIONS	SHEET NO. 3 OF AO SHEETS

ASSUMPTIONS
CHILLED LATER COOLING
ASSUME USO LATER
USE ROE. "ENTRZY CONSERVATION IN
EXISTING BUILDINGS FIG. 8.49

ASSUME I" IHSULATION



Keller & Gannon

Engineers-Architects

COMPUTED BY 7.12	ECO* B+	PROJECT 15-403-10
CHECKED BY	WELLKE PRE FAITHS	
DATE 1912 REV. JUNE 1993	HEAT LOSS SAVIETAS &	SHEET NO. 6 OF 20 SHEET

BLDG 6 - DOMESTIC HOT HATER HEATHY

BUTH 80- HOT WATER HEATHY

11/2" PIPE @ 50 FT WHIHSWATER

WO INSWLATION 150: BTW/HE BT LOSS

WI INSWLATION 25 BTW/HE BT LOSS

125: X50 FT = 62 5 KBTWH

625 KBTWH X59325 ° HZS/(70-24°)

8.06 MTWH XR/68.5% EFF

=11.8." MBTW/TR (PROPRIME)

PLDG 81 HOT WATER HEATHYS

2" PIPE & 20 PT UHHHOUNTED

WO INSULATION 175 BTU/HE

IN INSULATION 25 PITU/HR

150 BTU/HR 20 PT = 3 ICBTUH

2 ICBTUHX 13581"HES/(20°-24°)

- 0.9 MBTU/TR/74% - 1.2 MBTU/TR

PLDG 124-DOMESTIC HOT WATER OHLY

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY PUB	至00 3-4	PROJECT 16-402-10
CHECKED BY 511T 1913	HE WINTE PIPE + FITTITIS	
REV. JUNE 1993	HEAT LOSS SHUWAS de	SHEET NO. 7 OF 20 SHEETS

```
BLDG 127 - DOMESTIC LIT LITTER SILY
   ZUDA 131 - DOMESTIC HOTILATER SHLY
    BLOG 190. HOT HATER HEATING
            "Ly" PIE FAMILIES E 15 FT EXCUSIVEIT LENTITH
      1/0 IHSULATION 125 BTUH/FF
      W/HSULATION 20 BTUH/FT
                    105 BTUH/ PT= 1.6 KBTUH
          1.6 BRUHX 32596°HZS/(70°-24°)
   = Z.7 MBTU/TE/73.7% · 3,7 MBTU/TE (OIL)
   BLDG 197-DOMESTIC HET LATER OHLY
    BLDG TOG
     4" PIPE + FIMITYS 3" PIPE + FIMITYS 11/2" PIPET FIMITYS
                          15 FT
                                            10 PT
        IOT
WO HISULATION 300 FITCH/PT 250 BIWH/PT
                                          150 BILLITIET
HINEGULATION 75 PARITYPT 60
                                            25 BRUHIFT
           225 BILIT/FT
                          170 BRUIL PT
                                          125 BTUHLET
         × 10 FT
                        X 15 PT
2.85KBTU
                                         x 10 FT
           2.3 KBTU
                                           1.3 KATU
     = 6.45 KBTUVII5562° HR (75-24")
      = 16.2 MBTULL = 70.8% EFF. = 22.9 MBTULTE
```

Keller & Gannon

Engineers-Architects

COMPUTED BY ZJ3	FCO" B-4	PROJECT 10-403-10
CHECKED BY 514	We water ROET FITTITIES	
DATE MARCHE 1913	INDUCATION IN THE PROPERTY OF	SHEET NO. 8 OF 20 SHEET
REV. <u> </u>	HATHER SAVITING =	SHEET NO. CO. OF THE CHEETE

BLDG 207-

Z'/2' PIPE + FITTIMS @ 23 PT EQUIVELENT LENTITH

HO INSULATION 200 BILLIH/FT H/ IHSULATION 35 BILLIH/FT

165 BTUH/FT × 2070 3.3 KBTU

3.3 x 35.120°H/(70°-24°) = 6.1 MBTU/TR

6.1 + 71.4 % = 8.5 MBTU/TR (OIL)

BLD4 203

8.5 MBTU / (SEE 201)

RLD9 209 HOT WATER HEATTHS

114" PARE FATTHING @ 10 PT EQUIVILENT LEHATH

110 IHEMITTON 125 BTUHIFT HITE OS TOTINAM

105 BTUH/FT x 10 FT = 1 KBTUH

-1 x 71,527° HR-/(70-24°) = 1.5 MBTU/MR

7.5 + 51.2°/6=2,5 MBTU/MR (PROPINITE)

Σ	Keller	&	Gannon
***************************************		_	

Engineers-Architects

COMPUTED BY 72175	- Fro B-4	PROJECT 13-403-10
CHECKED BY DITT	WELL AND PRETENTINGS	
DAIEII	THE COURT OF THE C	SHEET NO. 9 OF 20_SHEETS
REV	Hom Loss Catultas 4	SHEET NO. 9 OF 30 SHEETS

BLD9 212 DOMESTIC HOT ISMER OILT

1/2" RPE ATO ATTITUS 3/4" PIPE + FITTINGS

WO HEULATION 150 BTU/HE FT 15

1/ 11+SULATION 25 ITU/HE FT 15

125 BTU/X 10FT 70 PTU/X 10FT

=1.25 KBTUH = 0.7 KBTUHFT

1.95 KBTUHX 85120°HZ/(70-24°) = 3.51 MBTU/12:67% = 2.4 MBTU/TR (PROPINE)

8.5 MBTU /TIZ (SEE BLIDG 207)

BLOY 230 8.5 MBTU/12 (SEE BLISH 207)

1	Σ	Keller	&	Ga	nno	n
_				_		_

Engineers-Architects

PROJECT 10-403-10 COMPUTED BY 72175 1993 SHEET NO. 10 OF 30 SHEE

```
BUDG 238
         HOT HATER HEATHY
11/2" FIRE ....

WO INSULATION ISO BTU/HR FT

WILLATION ZE BTU/HR FT

125 FTU/ × 10 FT = 1.25 FETUH

HR FT
             1.25 KBTUHX 60,531°H ((70°-24°)
           = 1.6MRTUH/TR/68.9% = 2.3 MBTUH (PROPANE)
 BLD9 241
         STEAT HEATHY CHILLED DATER COOLINTA
      HEATHA:
```

2 1/2 " RPE I FITTHAS

1/0 INSULATION HI HSULATION

275 BTUH/FFX 10FT = 2.75 KBTU

2.75 KBTUHX 60521° HR/ (70'-24") = 3.6 MBTC1/TR/66.6% = 5.4: MBTU/TE (PEOPINTE)

2" PAR FITTINGS

W/O IHSULATION 35 BTUH / 5 BTUH / FT 12/ 11/SULATION

30 BIRLIH/PTY 10FT= , 3KBTUH

ASSUME DERZEIO , KUH= . 03 . OZKNH, 15420"112/(102-72") - 15,4 KUH/

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY PUTS CHECKED BY PUTS DATE NAVIGATION 1993	ECO" B-d INSULATE PIPE + FITTINGS	PROJECT 16-403-10 FIL EERP
DATE 1973 REV. JUNE 1973	III SCIONI E TITLE	SHEET NO. // OF 20 SHEETS

BUDY 287 - DOMESTIC HOT WATER ONLY

BLOG 290 HH/HEATTHG CH/COULING HEATHS 1"0 PRE 1 FITTITIES WO INSULATION 100 BITCH/PT
H/INSULATION ZOBITCH/PT
BOBTCH/PT
20F = 1.6 KBTUH 1.6x 60,530°4/(70-24)= 2.1 MBTU/TR 2.1/63.8% FATE = 3.3+1BTU/TR (PROPERTE) COOLING
Z'\" PIPE + FITTINGS 1/0 IHSULATION 41 BTUH/PT H/HSULATION 6 BTUH/FT 35 BTUH/FTX 20 FT = 0.7 KBTUH DICH = 0.7 / EER (ASSUME FETT = 0.07 KW 0.07 KW (15420= H)(102-72") = 36 KWH/ (THES)

Keiler & Gannon

Engineers-Architects

COMPUTED BY 72173	1 Tart 2-4	PROJECT 16-403-10
OUTOKED DY TELL	The state of the s	FIN TERMS
	INSCRATE PIPE + FITTHES	2,12,12,12
REV	HEIM LOSS/GAMI CALCULATIONS	SHEET NO. 12 OF 20 SHEETS

BUDA 291

STEAM HEATING 2" PIPE | FITTINGS

1/0 1/5ULHTION 280 BAUH/PT 205 BAUH/PT × 10PT = 2.05 KBTUH

2.05 KBTUHX 60531 34 (70-24")= 5.7 MBTU/TR 5.7/59.8 % = MBTU/TE

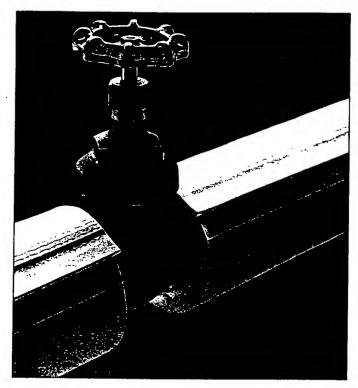
				Date Prepared		Sheet 4 Of			
CONSTRUCTION COST ES	TIMATE			February 1	February 1993 /3 20				
Project				Project No.	Basis for E	stimate	<u> </u>		
EEAP Limited Energy Study				!6-403-10	Code A	(no design compete	ed)		
Location					Journ	(no deargn compete	~,		
Fort Hunter-Liggett, California Engineer-Architect					1				
Keller & Gannon									
Drawing No.		Estimato			Checked 6	•			
ECO# B-4 (Insulate Pipe & Fittings)	Que	RJB Labor			ļ	BIH faterial			
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost		
Building 80									
1-1/2" Pipe Insulation	50	LF	\$2.50	\$125	\$2.00	\$100	\$22		
Subtotal Bidg 80							\$22		
Building 81									
2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$14		
Subtotal Bidg 81							\$14		
Building 190									
1-1/4" Pipe Insulation	15	LF	\$2.50	\$38	\$2.00	\$30	\$6		
Subtotal Bldg 190							\$6		
Building 206									
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$4		
3" Pipe Insulation	15	LF	\$3.50	\$53	\$5.00	\$75	\$12		
4" Pipe Insulation	10	LF	\$3.60	\$36	\$6.00	\$60	\$9		
Subtotal Bldg 190							\$26		
Building 207							444		
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$14		
Subtotal Bidg 207							\$140		
Building 208									
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$14		
Subtotal Bldg 208							\$14		
Building 209									
1-1/4" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$4		
Subtotal Bldg 209							\$4		
Building 219									
3/4" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$4		
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$4		
Subtotal Bldg 219				1		1	\$9		

				Date Prepared Sheet Of			
CONSTRUCTION COST EST	TIMATE			February 1	February 1993 /4 2		
Project				Project No.	Basis for Es	stimate	
EEAP Limited Energy Study				!6- 4 03-10			
Location					Code A (r	no design competed)
Fort Hunter-Liggett, California Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimato	r		Checked B	у	· · · · · · · · · · · · · · · · · · ·
ECO# B-4 (Insulate Pipe & Fittings)			RJB			BIH	
	No.	untity Unit	Per	Labor	Per	sterial	Total :
Line Item	Units	Meas.	Unit	Total	Unit	Total	Cost
Building 229							
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 229							\$140
Building 230							
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 230							\$140
7							
Building 238							
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$45
Subtotal Bldg 238							\$4
Building 241							
2-1/2" Pipe Insulation	10	LF	\$3.00	\$30	\$4.00	\$40	\$70
2" Pipe Insulation	10	LF	\$3.00	\$30	\$4.00	\$40	\$70
Subtotal Bldg 241				l			\$140
Building 290							
1" Pipe Insulation	20	LF	\$2.50	\$50	\$2.00	\$40	\$90
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 290							\$230
Building 291							
2" Pipe Insulation	10	LF	\$3.00	\$30	\$4.00	\$40	\$70
Subtotal Bidg 291							\$70
		<u>.</u>	-				
		ļ					
		ļ					
		<u> </u>					
			<u></u>				
	1			1	<u> </u>		

				Date Prepare	d	Sheet of		
CONSTRUCTION COST E	ESTIMAT	Έ		Februar	y 1993	1993 /5		
Project				Project No.		Estimate		
EEAP Limited Energy Study				16-403-1				
Location					Code A	(no design comp	eted)	
Fort Hunter-Liggett, California Engineer-Architect					_			
Keller & Gannon								
Drawing No.		Estimat	or		Checked	Ву		
ECO# B-4 (Insulate Pipe & Fittings)			RJB			BIH		
	Qu	antity	De-	Labor	Per	Material	T .1.1	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Total Cost	
Building 80	Rem	ovable	Insulat	ion				
1-1/2" Pipe Insulation	50	LF	\$2.50	\$12	5 \$5.22	\$261	\$386	
Subtotal Bldg 80						1	\$386	
							, , , , , , , , , , , , , , , , , , ,	
Building 81	Remo	ovable	Insulat	ion				
2" Pipe Insulation		LF	\$3.00	\$6	0 \$5.77	\$115	\$175	
Subtotal Bldg 81		<u> </u>	1	1			\$175	
Oublotal Blag O1							<u> </u>	
Building 190	Remo	ovable	Insulat	ion				
1-1/4" Pipe Insulation		LF	\$2.50	\$3	8 \$5.04	\$76	\$113	
Subtotal Bidg 190	- 15	<u></u>	Ψ2.50	1	5 45.54	Ψ, σ,	\$113	
Subtotal Blug 190		-				 	ΨΠ	
Building 206	Rem	hable	Insulat	ion				
Building 206		LF	\$2.50	\$2	5 \$5.41	\$54	\$79	
1-1/2" Pipe Insulation	15	LF	\$3.50	\$5		\$95		
3" Pipe Insulation	10	LF	\$3.60	\$3			\$148	
4" Pipe Insulation	10	LL	\$3.00	<u> </u>	5 \$7.06	\$71	\$107 \$204	
Subtotal Bldg 190							\$334	
Building 207	Pom	ovable	Insulat	ion				
		LF	\$3.00	\$6	0 \$5.97	6110	¢470	
2-1/2" Pipe Insulation	- 20		\$3.00	20	J 45.97	\$119	\$179 \$170	
Subtotal Bldg 207		 	 			-	\$179	
Ruilding 209	Bome) Nable	Insulat	ion				
Building 208		LF	\$3.00	\$6	\$5.97	\$119	¢170	
2-1/2" Pipe Insulation	20		\$3.00	φ <u>ο</u>	J 45.9/	\$119	\$179	
Subtotal Bldg 208			<u> </u>			<u> </u>	\$179	
Ruilding 200	Pome	l Wable	Insulat	ion			·	
Building 209		LF		,	\$ \$F 04	Ø50	ф т е	
1-1/4" Pipe Insulation	10		\$2.50	\$2	5 \$5.04	\$50	\$75	
Subtotal Bldg 209	-						\$75	
Duilding 040	- D)	lec:/-*					
Building 219			Insulat	· · · · · · · · · · · · · · · · · · ·	- 64.55	A :=	A =-	
3/4" Pipe Insulation		LF	\$2.50	\$2		\$47	\$72	
1-1/2" Pipe Insulation	10	ILF .	\$2.50	l \$2	5 \$5.22	\$52	\$77	

CONSTRUCTION COST ES	TAMIT	Ε		Date Prepared February	1993	Sheet of	10
Project				Project No. 16-403-10	Basis for		
EEAP Limited Energy Study			······································	Code A (no design competed)			
Fort Hunter-Liggett, California Engineer-Architect					-		
Keller & Gannon		Estimate	or .		Checked	By	-
Drawing No. ECO# B-4 (Insulate Pipe & Fittings)			RJB			BIH	
Line Item	No. Units	Unit Meas.	Per Unit	Labor	Per Unit	Vaterial Total	Total Cost
Building 229		ovable	Insulat	ion			
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$5.97	\$119	\$179
Subtotal Bldg 229							\$179
			1==::!::	<u> </u>			
Building 230			Insulat	10n \$60	\$5.97	\$119	\$179
2-1/2" Pipe Insulation	20	LF	\$3.00	\$00	\$5.97	\$119	\$179 \$179
Subtotal Bldg 230		-			1		Ψ170
Building 238	Remo	ovable	Insulat	tion			
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$5.22	\$52	\$77
Subtotal Bldg 238							\$77
			ll-	\ <u></u>	_		
Building 241		LF	Insulat	\$30	\$5.97	\$60	\$90
2-1/2" Pipe Insulation		LF	\$3.00	\$30	_ 	\$56	\$86
2" Pipe Insulation Subtotal Bldg 241	10		Ψ0.00	400	40.00	100	\$176
Subtotal Bidg 241							
Building 290	Remo	ovable	Insula	ion			
1" Pipe Insulation		LF	\$2.50	\$50		\$97	\$147
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$5.97	\$119	\$179
Subtotal Bldg 290							\$326
Building 291							
2" Pipe Insulation	10	LF	\$3.00	\$30	\$5.59	\$56	\$86
Subtotal Bidg 291	THE STATE OF THE S						\$86
				ļ			
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		1		1			

100 SERIES



For Light Duty Applications on Hot And Cold Surfaces

TMZ 175 Jacketed Flexible Polyurethane Foam Pipe Insulation

Use on Temperatures from -65°F to +220°F

Description: Thermazip® 100 Series consists of foam insulation laminated to a lightweight reinforced jacket. A patented locking trac, factory applied to the jacket, is used to snap Thermazip® on the pipe.

Uses and Applications: Suitable for light duty indoor applications on both hot and cold surfaces. Chemical resistance. plus ability to withstand repeated cleaning with detergents, makes this an excellent product for use where a clean appearance is important. Thermazip® 100 is used to insulate hot and cold pipes; control sweating and dripping pipes; protect personnel from burns; color code pipes; and control temperature of process liquids. Typical end users are: laundries, hospitals schools, offices and commercial buildings.

Available Forms: Available in standard 4-foot lengths or pre-cut to your specific requirements up to 25 feet to fit pipe and tube sizes up to 6 inches. Polyurethane foam insulation is standard in $\frac{1}{2}$, 1 and $\frac{1}{2}$ inch thicknesses.

ECO B4 Thermazip® Insulation 5#EET 170F2C

Options and Specifications

TMZ 100 Jacket

Description and Specification: Thermazip® 100 jacket is made of a strong polyester scrim laminated between 2 layers of PVC which provides excellent resistance to chemicals. The total thickness is .016 inches. Standard color is white, but red, blue, yellow or green is available.

Jacket Material and Properties	Values
Polyvinylchloride	
Polyester Fabric	
Total Weight	10 oz./sa. vd.
Ambient Temperature Range	+40°F to +150°F
Tensile Strength	Warp: 120 lbs./in.
(Fed. Method 191, 5100)	
Tear Strength	
/E 34-4 1404 E404)	Fill: 25 lbs.
Cold Crack (Fed. Method 191, 5204)	+10°F
Fire Hazard Classification	Self Extinguishing
(Fed. Method 191, 5903.2)	2 sec. max
(i cd. Welliod 131, 3300.2)	sec. max

Polyurethane Foam Type 75 Insulation

Description and Specification: The polyurethane foam used in the manufacture of Thermazip® is a highly stabilized polymeric material. Its physical properties are locked in so it resists further chemical reaction with elements in the environment. It is highly resistant to fungi and bacterial growth. It is formulated to meet nationally recognized flammability tests.

Insulation Material	Polyurethane Foam
Density	
Indent Load Deflection (25%)	20 lbs.
K Factor @ +75°F	0.27 BTU/hr/sq ft/°F/in
Service Temperature	65°F to +220°F
Fire Hazard Classification:	
California Bulletin #117	Pass
ASTM-D-1692 (UL Subject 94)	Pass
FAA 60 Second Vertical Burn	Pass
MVSS-302 Horizontal Burn	Pass

Specifications subject to change without notice. All statements and technical information contained herein are based on tests we believe to be reliable, but the accuracy or completeness is not guaranteed under all circumstances. All flammability ratings and specifications are based on laboratory tests and do not describe the performance of these materials in an actual fire situation. Before using Accessible Products Company products, the user shall determine suitability for the intended use, and user assumes all responsibility for improper selection.

Thermazip 100 Series Pipe Insulation

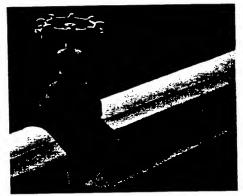
TMZ 175

Price List — Effective September 1, 1992 — Price Per Linear Foot

TMZ 100 Jacket Specifications

Jacket Description and Specification: Thermazip 100 jacket is made of a strong polyester scrim laminated between 2 layers of PVC which provides excellent resistance to chemicals. The total thickness is .016 inches. Standard color is white, but red, blue, yellow or green is available.

	Values
Polyvinylchloride	016 inches
Polvester Fabric	11 x 11 scrim
Total Weight	10 oz./sq./yd.
Ambient Temperature Range	+40°F to +150°F
Tensile Strenath	Warp: 120 lbs./in.
(Fed. Method 191, 5100)	Fill: 80 lbs./in.
Tear Strength	Warp: 24 lbs./in.
(Fed. Method 191, 5134)	Fill: 25 lbs./in.
Cold Crack (Fed. Method 191, 5204)	+10°F
Fire Hazard Classification(Fed. Method 191, 5903.2)	Self Extinguishing



Description: Thermazip 100 Series consists of foam or fiberglass insulation laminated to a lightweight reinforced jacket. A patented locking trac, factory applied to the jacket, is used to snap Thermazip on the pipe.

Thermazip Polyurethane Foam 75

The polyurethane foam used in the manufacture of Thermazip is a highly stabilized polymeric material. Its physical properties are locked in so it resists further chemical reaction with elements in the environment. It is highly resistant to fungi and bacterial growth. It is formulated to meet nationally recognized flammability tests.

Insulation Material	Polyurethane Foam
Indent Load Deflection 25%	20 lbs.
K Factor @ +75°F	0.27 BTU/hr./sq. ft./°F/in.
Service Temperature	65°F to +220°F
Fire Hazard Classification:	
California Bulletin #117	Pass
ASTM-D-1692 (UL Subjec	t 94)Pass
FAA 60 Second Vertical Bu	ırnPass
MVSS-302 Horizontal Bur	nPass

CONV	ERSION CI	HART			TMZ 175 Polyurethane Insulation			
iron	Copper	Stnlss	TMZ	GUIDE	C	onvoluted		
Pipe	Tubing	Tubing	Size		1/2"	1"	1 1/2"	
1/4	3/8	1/2	1/2	Α	3.43	4.38		
3/8	1/2		5/8	В	3.48	4,47		
	5/8		3/4	С	3.57	4.57		
1/2	3/4		7/8	D	3.65	4.66		
3/4		1	1	E	3.73	4.75	6.03	
	1	•	1 1/8	F	3.79	4.85	6.14	
1	1 1/4		1 3/8	G	3.94	5.04	6.36	
		1 1/2	1 1/2	<u>H</u>	4.03	5.13	6.47	
1 1/4	1 1/2		1 5/8		4.09	5.22	6. 58	
1 1/2			1 7/8	J	4.26	5.41	6.81	
		2	2	K	4.32	5. 51	6.91	
	2		2 1/8	L	4.40	5.59	7.01	
2			2 3/8	M	4.55	5.77	7.25	
		2 1/2	2 1/2	N	4.62	5.88	7.35	
	2 1/2		2 5/8	0	4.70	5.97	7.46	
2 1/2			2 7/8	P	4.85	6.16	7.68	
		3	3	Q	4.92	6.24	7.79	
	3		3 1/8	R	5.00	6.35	7.90	
3			3 1/2	S	5.23	6.62	8.23	
	3 1/2		3 5/8	T	5.31	6.72	8.34	
		4	4	U	5.53	7.00		
	4	ļ	4 1/8	V W	5.61 5.83	7.08	9.11	
4			4 1/2	X	6.14	7.74	9.11	
ļ ·		5	5 1/8	Ŷ	6.22	7.84	9.67	
	5	-	5 1/2	Z	6.44	8.12	9.99	
5		6	6	AA	6.75	8.50	10.43	
	6	+ -	6 1/8	BB	6.82	8.58	10.55	
6	- 0	-	6 5/8	CC	7.13	8.96	11.75	
0	 	8	8	DD	1	1		
	8	1	8 1/8	EE				
8	<u> </u>		8 5/8	FF				
-		10	10	GG				
10	-	+	10 3/4	НН				
10	 	12	12	- 11				
12			12 3/4	JJ				
14		14	14	KK				
-16-		16	16	LL				
18		18	18	MM				
20		20	20	NN				
22		22	22	00				
24		24	24	PP				

- Pipe insulation is standard in 4-foot sections and includes free butt strips required for installation.
- · Jacket Colors Available: Red, Blue, Yellow, Green, White.
- See the fitting cover price list for matching insulating fitting covers and income
- For other accessories, see our Thermazip® accessories price list.



2122 West 5th Place, Tempe, Arizona 85281 • (602) 967-8888 • 1-800-922-5252 • FAX 1-602-894-6255

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B4 Sheet 8 of 8'

		Fort Hunter Ligg Insulate Pipes & F	ittings	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
		on Name: ECO# 6 : March 1993	B-4 (Standard Insulat	ion) Economic Life:	15	YEARS	Preparer: KELLER & GANNON
	1. Investment	Costs			-		
	A. Construction	on Costs	<u> </u>	\$2,794	_		
	B. SIOH			\$154	_		
	C. Design Co	st		\$168			
		(1A+1B+1C)		\$3,115		4-	
		alue of Existing Eq				\$0	_
		ty Company Rebat	te			\$0	#0.14F
	G. Total Inves	stment (1D-1E-1F)					\$3,11 5
		vings (+)/Cost(-):	for Discount Factors		-		
				Annual \$		Discount	Discounted
	Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
	A. Elec.	\$18.23	0.1	\$0.9 6		11.70	\$11
	B. Dist	\$4.98	60.6	\$301.79	,	13.78	\$4,159
	C. Propane	\$7.87	39.1	\$307.72		14.16	\$4,357
	D. Demand	\$108.60		:W \$0.00		11.70	\$0
	E. Other						
	F. Total			\$610		,	\$8,527
	3. Non Energ	y Savings (+) or C	Cost (-):		-		
	A. Annual Re	curring (+/-)		(\$70)			
		Factor (Table A)			•	11.12	
	(2) Discounte	d Savings/Cost (3	A x 3A1)				(\$777)
	B. Non Recur	ring Savings (+) o	or Cost (-)				
	lte m	Savings(+)	Year of	Discount		Doscounted Sav-	
		Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
	a.			_ 1			
	b.						
	C.				= :		
	d. Total						
	C Total Non i	Energy Discounted	Savings (3A2+3Bd4)			(\$777)	
ı	4. Simple Pay	/back 1G/(2F3+3A	+(3Bd1/Economic Li	fe)):		5.8	Years
7		iscounted Savings				\$7,750	RECOMMENDED
		Investment Ratio (2.49	
	7. Adjusted Ir	nternal Rate of Retu	um (AIRR):			10.51%	

7. Adjusted Internal Rate of Return (AIRR):

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B4 Sheet & of & a0 20

10.25%

Project No. 16-403-10

Region No. 4 Fort Hunter Liggett, California Location: Fiscal Year FY96 Project Title: Insulate Pipes & Fittings Discrete Portion Name: ECO# B-4 (Removable Type Insulation) Economic Life: 15 YEARS Preparer: KELLER & GANNON Analysis Date: June 1993 1. Investment Costs \$3,378 A. Construction Costs \$186 B. SIOH C. Design Cost \$203 \$3,766 D. Total Cost (1A+1B+1C) \$0 E. Salvage Value of Existing Equipment \$0 F. Public Utility Company Rebate G. Total Investment (1D-1E-1F) \$3,766 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discount Discounted Annual \$ Energy Cost Saving Factor(4) Savings(5) \$/MTBU/(1) MBTU/YR(2) Savings(3) Source \$0.96 11.70 \$11 \$18.23 0.1 A. Elec. 60.6 \$301.79 13.78 \$4,159 \$4.98 B. Dist 14.16 \$4,357 39.1 \$307.72 \$7.87 C. Propane 0.0 \$0.00 11.70 \$0 \$108.60 D. Demand E. Other \$8,527 \$610.46 F. Total 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) (\$68)11.12 (1) Discount Factor (Table A) (\$751)(2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Doscounted Sav-Discount Year of Savings(+) Item Cost(-)(1) Occur. (2) Factor(3) ings(+)Cost(-)(4)\$1,883 10 0.67 \$1,262 a. b. C. \$1,262 10 d. Total \$1,883 C Total Non Energy Discounted Savings (3A2+3Bd4) \$510 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): NOT 5.6 Years 5. Total Net Discounted Savings (2F5+3C): \$9,038 RECOMMENDED 2.40 6. Savings to Investment Ratio (SIR) 5/1G:

Keller & Gannon
Engineers-Architects

COMPUTED BY 200	王のでも	PROJECT 103-10
DATE 19 19 19 19	OF THE MARKETINE BESET	SHEET NO. 1 OF 6 SHEETS

DESCRIPTION OF ACTION

Reducing the hot water supply temperature by adjusting hot water boilor set points reduces conduction losses from piping and slightly improves boilor performance. Control retrotits consist of differential temperature controllers that adjust hot water boilor set points proportionally in the range of 200° to 180° f when outside air temperatures are between 40° f and 65° f. Existing heating hit water supply temperatures are used when outside air temperatures are used when outside air temperatures are below 40° f. No heating is allowed for outside air temperatures are below 40° f. No heating is allowed for outside air temperatures above 65° f.

FACILITIES INCLUDED

All buildings hooted using hot water boilers are considered.

ENERGY SAVING CALCULATIONS

BOILER PERFORMANCE IMPROVEMENT

FORMULA to calculate that Transfer, comb.

Gasses to circ Heating Hot water in Boiler

Tubes: $k = f(BTU/\Delta T - inch - SQFT)$

Keller & Gannon

Engineers-Architects

COMPUTED BY RUB	モニッサ まっと	PROJECT 16-403-10
CHECKED BY FIH	400	FIL FEAP
DATE NINCH 1973	PUTSIDE AIRTEMPERATURE	
REV 19	EESI=1	SHEET NO OF SHEETS

Lowering HHW Temp. will result in the same boiler K: $K_1 = K_2$ since thickness (inches) and area (se FT) remain lonstant, thus $\frac{BTUH_2}{\Delta T_2} = \frac{BTUH_1}{\Delta T_1}$

 $BTOH_2 = (\Delta T_2/\Delta T_1)$ BTOH,

represents increased heat trunsfer efficiency.

where: $\Delta T_1 = 750^{\circ}F - \left\{ \frac{200 + 180}{2} \right\} = 560^{\circ}F$ $\Delta T_2 = 750^{\circ}F - \left\{ \frac{180 + 160}{2} \right\} = 580^{\circ}F$

AT, = Comb. temp. less HHW Aug Temp. (200°F Suppy, 180°F Return assumed 20°F AT HHW)

AT2 = same as DI, except reduced to 180°F supply \$ 160°F Return.

NOTE: RETURN TEMP MINIMUM 160°F TO PREVENT CONDENSING IN BONER.

AUG. TEMP IN BLR 750°F.

BTUH 2 = 580/560 BTUH, = 1.0357 =>

3.57% efficiency improvement @ 65°F OSA.

AUG, EFF. IM PROVEMENT:

3.57 x DEG HRS BETWEEN 40 \$650=

DEL HRS BELOW 650=

E Keller & Gannon

Engineers-Architects

COMPUTED BY RIE	FC5"3-5	PROJECT 16-403-10
DATE NINCH 1973	OUTSIDE AND TEMPERATURE	
REV19	LESI: 1	SHEET NO. 2 OF 6 SHEETS

Lowering HHW Temp. will result in the same boiler k: $k_1 = K_2$ since thickness (inches) and area (so FT) remain constant, thus $\frac{BTUH_2}{\Delta T_2} = \frac{BTUH_1}{\Delta T_1}$

 $BTOH_2 = (\Delta T_2/\Delta T_1)$ BTOH,

represents increased heat trunsfer efficiency.

where: $\Delta T_i = 750^{\circ} F - \left\{ \frac{200 + 180}{5} \right\} = 560^{\circ} F$

 $\Delta T_2 = 250^{\circ}F - \left\{ \frac{180 + 160}{3} \right\} = 580^{\circ}F$

AT, = Comb. temp. less HHW Aug Temp. (200°F Suppy, 180°F Return assumed 20°F AT HHW)

AT2 = same as AT, except reduced to 180°F supply \$ 160°F Return.

NOTE: RETURN TEMP MINIMUM 160°F TO PREVENT CONDENSING IN BOKER.

AUG. TEMP IN BER 750°F.

BTUH 2 = 580/560 BTUH, = 1.0357 =>

3,57% efficiency improvement @ 65°F OSA.

AUG, EFF. IM PROVEMENT:

3,57 x DEG HRS BETWEEN 40 \$650=

Keller & Gannon

Engineers-Architects

COMPUTED BY RUB	1 FUOT B-5
CHECKED BY BIK 1912	JA TEMPERATURE VESSE
REV 19	

PROJECT 16-405-10

FIRET NO. 3 OF 6 SHEETS

CONDUCTION LOSSES

OF H COST

ALLOW 2 MH /YR / CONTROL SYSTEM & MECHANICAR - HEATING @\$ 3.54 / HR = \$7.08 /YR

Keller & Gannon

Engineers-Architects

COMPUTED BY 213	Eco# 3-5	PROJECT 16-403-10
DATE MARCH 1913	CUISIDE AIRTEMY RESET	PHUERITE
REV19	FHERMY SAULUS CALLS	SHEET NO. 4 OF 6 SHEETS

ALL BUILDINGS EXAMITED CURRENTLY HAVE OUTSIDE MR TEMPERATURE RESET CONTROL OH HOT WATER BOILERS WITH THE EXCEPTION OF BUILDING 101.

BL09 101

BOILER SIZE = 300 KBTUH

SAVITAS:

AND EFFICIENT IMPROVEMENT = 3.57 x \$161 96632

- 0-19% + 0.33% COHOLLITOH LOSS 0.52%

CUPPLET BOILER EFFICIETY = 67.9% EFFICIETY W/FCO:

Δ HPUT BTUIT: 300 _ 300 = 3.34 14374
0.679 0.6842

3.301 (CBTUX 966320H/(70-24)=7 MBTU/TR

7 MBTU /10x \$4.98/10 = \$35/TR

@ 15 TRS (UP) = 11.12) TOTAL SAVINGO = \$389

CONSTRUCTION COST EST	TIMAT	Έ		Prepared February 1993		Sheet 5 Of 6		
Project				Project No.	Basis for	Estimate		
EEAP Limited Energy Study				16-403-10				
Location				<u> </u>	Code A	(no design compe	rted)	
Fort Hunter-Liggett, California								
Keller & Gannon		Estimat	~		Checked	Av		
Drawing No.	2001	CBUITHE	RJB		0.120.00	BIH		
ECO#-B5 (Outside Air Temperature Re	Qu	antity	1100	Labor	L	Material		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
	0							
Controller	1	EA	\$39	\$39	\$450	\$450	\$489	
Remove Old Control	1	EA	\$39	\$39			\$39	
Wiring		Lot	\$150	\$150	\$30	\$30	\$180	
Subtotal	 	-	¥1.55				\$708	
Sales Tax @ 8%	+	_					\$5	
Subtotal	+						\$76	
Contractor OH & Profit @ 30%	+	-					\$22	
Subtotal	+				-		\$99	
Bond @ 1%	+						\$1	
Subtotal	+	 			-		\$1,00	
	 						\$10	
Estimating Contingency @ 10% Total Probable Construction Cost	+						\$1,10	
Total Probable Construction Cost	+							
	+							
	+	-		<u> </u>	 	 		
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Life Cycle Cost Analysis Summary ECO B-5 Energy Conservation Investment Program (ECIP) Sheet 6 of 6

•	Fort Hunter Lig Install Outside Ai ion Name: ECO#	ir Temperature Reset	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	e: March 1993		Economic Life:	15	YEARS	Preparer: KELLER & GANNON
1. Investmen			24.464	_		
A. Constructi	on Costs		\$1,104 \$61	-		
B. SIOH C. Design Co			\$66	-		
_	: (1A+1B+1C)		\$1,231	-		
	alue of Existing E	duinment	41,251			
_	ity Company Reb	•		-		
•	stment (1D-1E-1F			-		\$1,231
	vings (+)/Cost(-)			_		
Date of NIST	IR 85-3273-X Use	d for Discount Factor	•			
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84		\$0 -		11.70	\$ 0
B. Dist	\$4.98	7	\$35	_	13.78	\$480
C. Propane	\$7.87		\$0	-	14.16	\$ 0
D. Other				_		
E. Demand S	avings					
F. Total			\$35			\$480
3. Non Energ	y Savings (+) or	Cost (-):		-		
A. Annual Re	curring (+/-)		(\$7)			
	Factor (Table A)			-	11.12	
(2) Discounte	d Savings/Cost (3A x 3A1)		_		(\$78)
B. Non Recu	rring Savings (+)	or Cost (-)				
Item	Savings(+)	Year of	Discount	1	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	i	ngs(+)Cost(-)(4)	
a.						
b.				-		
c.				-		•
d. Total				~ =		•
C Total Non i	Energy Discounte	nd Savings (3A2+3Bd4	4)		(\$78)	
4. Simple Per	hack 10//2F3±3	A+(3Bd1/Economic L	ife)):		44.2	Years
•	biscounted Saving				\$403	
	Investment Ratio	• •			0.33	
	ternal Rate of Re				-11.17%	

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COMPUTATION SHEET

Engineers-Architects

	PROJECT_16-403-10
COMPUTED BY PJB/BIH CHECKED BY BIH/RJB DATE HARCH 1993 TUSTALL TIME CLOCKS OR	PHL-REAP
DATE HANCH 1973 LUSTACE TIME COOKS DE	SHEET NO. / OF /5 SHEETS
REV	
DESCRIPTION OF ACTION	
Install programmable T-St	ats or 7-den
Install programmare	
24- hour time clocks to con	HOO HVAC
- systems in selected built	dings.
	handing and
- Assore that simultaneous	neuring und
cooling do not occur and	nouida a
dead-band between hea	ting and
DEACE SOUTH	
cooling set point temperat	ures,
Facilities Included	
Le or to attached spreads he	est printouts:
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	eet printouts!
Energy Saving Calculations	
Energy Saving Calculations	
Energy Saving Calculations Two categories of calculations	are used:
Energy Saving Calculations Two categories of calculations	are used:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy	are used:
Energy Saving Calculations Two categories of calculations	are used:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by	are used:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy	are used:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-run	are used. use are compalor useth revised.
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by	are used. use are compalor useth revised
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-run temperature schadules	are used: use are compalor useth revised: and loch outs
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-run temperature schodules a of simultaneous heating	are used: use are compalor useth revised: and lock outs
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-run temperature schodules a of simultaneous heating	are used: use are compalor useth revised: and lock outs
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program wave re-run temperature schoolies a continuation boilding energy.	are used: use are worth revised: and locktowis
Energy Saving Calculations Two categories of calculations Boildthys whose HVAC energy simulated using Trace by program wave re-run temperature schodules a coloring boilding energy s	are used: use are worth revised: and locktowis
Energy Saving Calculations Two categories of calculations Boildthys whose HVAC energy simulated using Trace by program wave re-run temperature schadules a col simultaneous heating Remaining building energy determined based on	are used: use are worth revised: and lock outs anings were baseline
Energy Saving Calculations Two categories of calculations Boildthys whose HVAC energy simulated using Trace by program wave re-run temperature schodules a coloring boilding energy s	are used: use are worth revised: and lock outs anings were baseline
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program weve re-ron temperature schoolies of simultaneous heatin Remaining building energy sherminal based on HVAC energy use estim	are used: use are with revised: and lock outs aurings were baseline mates factored
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-run temperature schadules a consining building energy begrining building energy desermined based on	are used: use are with revised: and lock outs aurings were baseline: nates factored
Energy Saving Calculations Two categories of calculations Boildings whose HVAC enorgy simulated using Trace by program were re-run temperature schoolies of simultaneous heatin Remaining building energy sherminal based on HVAC energy use estim	are used: use are with revised: and lock outs avings were baseline. inates factored Il-load-hours

FORM 101-1/8

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COMPUTATION SHEET

Engineers-Architects

COMPUTED BY CHECKED BY DATE	19 13 14517	120 B-6/	ocks_	PROJECT 16-403-10 HTC FETT	
REV.		包600 1位	CH113 1:415	SHEET NO OF SHEETS	
		Trace 600		·	
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- 46 XX	HE	occupinter		FD, 11+12002 TERMINE	
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	11=13	HO		an). COOLING PROVI	
	13-18	YES		280 MBH RITCHREET	
1	18-20	HO.		12, HEATHER VARIETY	
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<u>.</u>				JAMES HEATER	
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Keller & Gannon

Engineers-Architects

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REV.	- 19- TEXCEZ	600 Assur	MPTVATS CONTINUET NO. 3 OF 15 SHE
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- BUILDING	OCCUPA	HUT SCH	FIRILE SYSTEM MODEL.
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	9=17	125	CHILLES AND HEATER
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295 44	0=11	YES	CI) FAT COIL SYSTEM (
	11-13	НО	ROOM) COOLED BY (1)
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V-C 72-7-		, # 12 - 7	COOLING MAD TEETHER
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FORM 101-1/8

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COMPUTATION SHEET

Engineers-Architects

COMPUTED BY 72 473	ECO#3-6/7	PROJECT 16-403-10
CHECKED BY BIH	PEDARLIMINITSUE T-STITT	
REV19	TRACE 600 ASSUMMONS	SHEET NO. 4 OF 15 SHEETS

REV	1100 00	ASSUMMENT SHEET NO
BUILDING TOTAL SCI	E121/E	SYSTEM MODEL
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<u> </u>	00	
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22:0 55	88	ELECTRIC COSCED/ELECTRIC HEAT
		HALL AC LIHAT (CITABLE 11 TOAS)
- IJEEKONY		
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18-20-55	38	CHILER, HEATING PROVIDED B
20-0_65	78	(1) 288 MBH PROPRITE FIRED
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LECKDAY		
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9-17 65	78	HEAT WHAT
7-0 55	38	
LEGEEND		
0-29 55	38	(1) PACKAGED, ROOF TOP PERCET
	- 22	COOLED / GAS HEAT WHIT
101-00-9 33		(CIHPER IS TOHS)
1-11-03	22	
11-24 35		

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COMPUTATION SHEET

Engineers-Architects

COMPUTED BY RJ	13_1 =	ECO*B.6	17	PROJECT 19-403-10
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REV.		E (00) HE CON		SHEET NO. 5 OF 15 SHEETS
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Engineers-Architects

COMPUTED BY 2413	0 = 3-617	PROJECT 16-403-10
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	CHC OM/TRAINING \$	SHEET NO. 51 OF 15 SHEETS
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HISTIZ 35	-3273-X @ 4%	15 11,12
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RM 101-1/8

Eco 86/7 Sheet 6 of 15

Fac		Existing Schedule	П	Heating Season	ason	Cooling	Degree Ho	Degree Hours per Year,	7 Days/Wk			FULL LOAD HOURS/YEAR	URS/YEAR]
Š	Installation Name	Time	9	Setpoint	Setback	Setpoint	Heating	Heating	Htg Setbk	Total	Total	Heating	Cooling
		HVAC ON	HVAC OF	Deg F	Deg F	Deg	NO	Set-Back	7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
و	Family Housing NCO & Eni	909	2200	R	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 414	Family Housing NCO & Eni	009	2200	02	55	72	28'082	25,104	44,615	93,192	21,833	1,480	728
P 41B	Family Housing NCO & Enl												
P 42A	Family Housing NCO & Enl	009	2200	0/2	22	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 42B	Family Housing NCO & Ent												
P 43A	Family Housing NCO & End	8	00Z	2	જ	72	280'89	25,104	44,615	93,192	21,833	1,480	728
2	raminy Housing NCO & Eni		0000					1					1
P 44A	Family Housing NCO & En	3	902	2	S	72	280'89	25,104	44,615	93,192	21,833	1,480	728
100	raminy Housing NCU & Eni											,	
P 45A	Family Housing NCO & Ent	8	2200	2	S	72	68,087	25,104	44,615	93,192	21,833	1,480	728
438	ramity Housing NCO & Eni				1								
P 46	Family Housing CG & WO	009	2200	02	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 47	Family Housing CG & WO	900	2200	2	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 51A	Family Housing NCO & Ent	009	808	2	55	22	68,087	25,104	44,615	93,192	21,833	1,480	728
P 51B	Family Housing NCO & Enl												
P 52A	Family Housing NCO & Enl	8	2002	20	55	72	28'082	25,104	44,615	93,192	21,833	1,480	728
P 52B	Family Housing NCO & Enl												
P 53	Family Housing CG & WO	009		70	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 54	Family Housing CG & WO	09 9		70	55	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 55	Family Housing CG & WO	900	2200	70	55	72	68,087	25,104		93,192	21,833	1,480	728
P 56	Family Housing CG & WO	800		70	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 57	Family Housing CG & WO	009		70	55	72	28'082	25,104		93,192	21,833	1,480	728
P 58	Family Housing CG & WO	009		70	55	72	280'89	25,104		93,192	21,833	1,480	728
P 59	Family Housing CG & WO	900	2200	20	55	72	68,087	25,104			21,833	1,480	728
P 60	Family Housing CG & WO	900		2	55	72	68,087	25,104			21,833	1,480	728
S 79	Post Office, Main	900		8	55	72	14,071	40,610		53,242	18,106	436	517
P 80	Exchange, Main Retail	006		89	22	72	18,715	40,610	44,615	59,325	18,106	425	604
P 81	Theater with Dressing Rm's	1600	2300	59	92	72	19,809	5,000	5,161	13,581	9,650	77.2	138
P 101	Open Din Cons (Hacienda)	1000	1600	20	22	72	14,616	42,688	44,615	57,304	15,420	318	514
	Club (Bar)	1600	220	20	53	72	21,855	40,134	44,615	61,989	9,650	475	322
	Hacienda, East Rooms	1700	8	2	55	₹	98,616	7,025	44,615	105,641	ž	2,144	0
	Hacienda, West Hooms							-					
P 116	Exchange Service Station	909	1900	8	Q	¥ Z	26,821	3,537	5,161	30,357	₹	745	0
	(Non-shop areas)	800	1900	88	\$	72	47,065	3,537	5,161	50,602	21,102	1,070	703
120	Fire Station - Office	009	8 2 2 3	8	SS	72	60,015	25,104	44,615	85,120	21,833	1,364	728
	Fire Station - Dorm												
	rire Station - Garage								4				
T 121	Bowling Center	800		89	55	72	42,842	33,140	44,615	67,020	21,833	911	220
T 124	Family Housing LC & MJ	009		70	52	72	280'89	25,104		_	21,833	1,480	728
T 127	Officers Quarters Military	900	2200	89	55	72	60,015	25,104	44,615	85,120	21,833	1,364	728
P 128	Officers Quarters Military	009		89	55	72	60,015	25,104			21,833	1,364	728
T 131	Family Housing CG & WO	009	İ	70	જ	72	280'89	25,104	Ш		21,833	1,480	728
\$ 144	Gymnaslum	Not in Use		Not in Use				Not in Use					
S 146	FE Facility	700	1600	જ	\$	78	10,781	3,537			9,003	281	268
T 149	Family Housing NCO & Ent	8	-	2		22	68,087	25,104	_	93,192	21,833	1,480	728
T 156	FE Facility - Shop	2		8		78	10,781	3,537		I	6,003	281	268

Fig. Particle Pa	- 180		Existing So	chedule	Heating Season	Π	Cooling	Degree Ho	Degree Hours per Year, 7 Days/W	7 Days/Wk			FULL LOAD HOURS/YEAR	JUHS/YEAR
Figure F	ġ	Installation Name	Time	Time	Setpoint	Setback	Setpoint	Heating	Heating	Htg Setbk	Total	Total	Heating	Cooling
Maint Bostory Maint Book		EE Eachtra - Other	HVAC ON	HVAC OF	- Bed	Deg F	Peg T	Š	Set-Back	7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
Marine Control Part Decides 1500	- 2	Vehicle Steeres	1 1 1 1 1 1 1 1 1 1 1 1 1		1									
Company Holland Research 100 1	3 3	Admired Constant Director	100		PSO III TONI	100	C	90000	Not In Use	1,0,,,	100.00	30, 2,	1035	
		Admin Ceneral Purpose	3	000	8	SS	77	33,064	33,833	44,615	155,09	15,420	99/	367
Administrative 700 1600 68 55 72 33,664 33,833 44,615 60,531 15,420 756	792	Elec Maint. Shop	80/	1600	83	3	72	33,064	33,833	44,615	60,531	15,420	756	367
Admin Central Purpose 770 1650 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Admin Central Purpose 770 1650 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Ober sell Durbug 770 1650 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Obd Storage Warehouse 770 1600 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Obd Storage Warehouse 770 1600 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Child Development Critic 700 1600 68 55 72 33,664 33,833 44,615 60,531 15,420 756 Admin Bidg RD. Office Storage Marke Dougle 700 1600 85 72 18,566 33,833 44,615 <t< th=""><th>3</th><th>Officers Cuarters Military</th><th>8</th><th>1600</th><th>8</th><th>જ</th><th>72</th><th>33,064</th><th>33,833</th><th>44,615</th><th>60,531</th><th>15,420</th><th>756</th><th>367</th></t<>	3	Officers Cuarters Military	8	1600	8	જ	72	33,064	33,833	44,615	60,531	15,420	756	367
Chair Dermis Princip Commission Chair Dermis Princip Commission Chair Dermis Der	104	Admin General Purpose	700	99	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Michael Charles Millary 700 1500 66 55 72 33,554 44,515 64,551 15,420 766	5	Admin General Purpose	700	8	88	55	72	33,064	33,833	44,615	60,531	15,420	156	292
Complement Purpose Complement Chiral Building Complement Chiral Buil	8	Officers Quarters Military	700	<u>8</u>	88	55	72	33,064	33,833	44,615	60,531	15,420	156	367
Complete Part Name Part	167	Officers Quarters Military	700	1600	88	55	72	33,064	33,833	44,615	60,531	15,420	756	2967
Company Watchest Library Company Watchest Library Company Watchest Library Company Watchest Library Company Watchest Library Company Watchest Wa	168	General Purp Warehouse	700	1600	89	55	72	33,064	33,833	44,615	44,615	15,420	0	0
Learning Liberary 100 15	172	Cold Storage Warehouse	NA	NA	ΥN	Ž	¥		٠	•	٠	٠	•	1
Complexed Name Inchit 600 1800 72 55 72 68.68 56.86 74.61 74.61 74.61 74.61 74.61 74.61 74.61 74.61 74.61 74.61 74.61 75.61 18.93 10.02 75.61 75.62 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.61 75.62 75.62 75.61 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62 75.62	177	Technical Library	200	1600	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Supplied Problem 700 66 55 72 18,716 44,616 65,717 18,106 46,61 44,616 65,717 18,106 46,61 44,616 65,710 18,106 46,61 18,206 44,616 65,20 71,62 76 <th>178</th> <th></th> <th>009</th> <th>1800</th> <th>72</th> <th>53</th> <th>72</th> <th>56,886</th> <th>29,446</th> <th>44,615</th> <th>74,412</th> <th>19,953</th> <th>1,022</th> <th>475</th>	178		009	1800	72	53	72	56,886	29,446	44,615	74,412	19,953	1,022	475
Beat Chaired Bidg 700 1600 55 75 33,004 33,633 44,615 60,531 15,420 756 Peat Chaire Bidg RD- Chifford 700 1600 65 72 33,004 33,633 44,615 60,531 15,420 756 Adhin Bidg RD- Chifford 700 1600 68 72 72 33,004 33,633 44,615 60,531 15,420 756 Admin General Intel Bidg Amin General Purpose 600 2200 68 75 72 60,015 75,104 44,615 75,207 71,833 7,137 Company Ho Building Chair General Intellige Chair General Chiff Reserved who Dining Chair General Chiff Reserved who Dining Chair General Chiff Reserved who Dining 600 2200 68 75 60,015 25,104 44,615 75,207 21,834 1,334 Company Ho Building Chair General Chiff Reserved who Dining	182	$\overline{}$	006	1700	88	55	72	18,715	40,610	44,615	55,122	18,106	268	431
Admin Bidg Rato - Ordical Control 70 150 55 72 33,560 29,066 44,615 62,556 21,102 1,163 Admin Bidg Rato - Ordical Admin Bidg Rato - Ordical Init Bidg 70 1600 68 72 115,562 3,534 4,615 62,536 1,167 756 Admin Bidg Rato - Electronics 70 2400 68 66 72 115,562 3,537 4,615 66,537 1,542 756 Admin General Purpose 600 2200 68 72 115,562 2,510 4,615 65,120 2,1833 1,37 Company Hot Building 60 2200 68 75 72 60,015 25,104 4,615 65,120 2,1833 1,384 Anna Land Building 60 2200 68 75 72 60,015 25,104 4,615 65,120 2,1833 1,384 Anna Land Building 60 2200 68 75 41,656 65,120 1,582 2,1833 1,584 <th>186</th> <th>_</th> <th>700</th> <th>1600</th> <th>89</th> <th>55</th> <th>72</th> <th>33,064</th> <th>33,833</th> <th>44,615</th> <th>60,531</th> <th>15,420</th> <th>756</th> <th>367</th>	186	_	700	1600	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Admin Bldg RAD - Electroches 70 1600 68 55 72 33.094 33.693 44.615 60.631 15.420 756 Admin Bldg RAD - Electroches 60 24.00 66 75 77.559 3.537 5,161 16,562 21,833 26.26 Admin General Inst Bldg 80 180 66 75 77.559 3.537 5,161 16,562 21,833 2,826 Admin General Inst Bldg 80 2400 66 75 77.559 3.537 5,161 16,562 21,833 1,384 Enllased Pere Divillegy 80 2200 68 55 77 60,015 25,104 44,615 65,120 21,833 1,384 Company Hollauling 80 2200 68 55 77 60,015 25,104 44,615 65,120 21,833 1,384 Company Hollauling 80 2200 68 55 77 44,615 65,120 21,833 1,384 Admi	190	_	009	1900	70	55	72	53,500	29,096	44,615	82,596	21,102	1,163	703
Admin Big RD - Electronice 0 2400 68 40 72 115,562 0 0 1,137 2,256 Admin Big RD - Electronice 800 2200 68 40 72 60,015 2,577 6,104 4,615 73,547 21,833 1,137 Admin General Parpose 600 2200 68 45 72 60,015 2,5104 4,615 73,547 21,833 1,137 Admin General Parpose 600 2200 68 68 72 115,562 0 115,562 21,833 1,137 Admin General Parpose 600 2200 68 55 72 60,015 25,104 4,615 73,47 1,337 1,334 Company HO Building 600 2200 68 55 72 40,615 25,104 4,615 80,120 21,834 4,534 Company HO Building 60 2200 68 55 72 40,615 25,104 4,615 80,120 21,8	197	Admin Bidg R&D - Office	700	1600	83	જ	72	33,064	33,833	44,615	60,531	15,420	756	367
Acomponental Intelliging 800 1800 688 40 72 27.529 3.537 5.161 19.963 19.953 3.92 Acomponental Intelliging 800 2500 68 55 72 60.015 25.104 44.615 73.547 21.833 1,137 Componental Pulling 600 2400 68 55 72 60.015 25.104 44.615 73.547 21.833 1,384 Company HO Building 600 2200 68 55 72 60.015 25.104 44.615 86,120 21.833 1,384 Company HO Building 600 2200 68 55 72 41.922 28,168 44.615 86,170 21.833 1,384 Company HO Building 600 2200 68 55 72 41.922 28,168 44.615 86,170 21.833 1,384 Action Company HO Building 600 2200 68 75 44.615 85,170 21.833 45.		Admin Bidg R&D - Electronics	0	2400	88	8	72	115,562	0	0	115,562	21,833	2,626	728
Admin General Purpose 60 250 68 72 60,015 25,104 4,615 73,547 21,833 1,137 Company HO Building Company HO Building 60 2400 68 77 115,562 0 0 115,562 21,833 1,137 1,137 Interest Fore Dring Feat Dring Feat Switch we Dring Feat Switch with Company HO Building 600 220 68 77 60,015 25,104 44,615 65,120 21,833 1,364 Eni Barracke w/e Dring Feat World Company HO Building 600 2200 68 55 77 60,015 25,104 44,615 85,120 21,833 1,364 AMFES Strack w/e Dring Feat World Company HO Building 600 2200 68 55 77 60,015 25,104 44,615 85,120 21,833 1,364 AMFES Strack World Company HO Building 600 2200 68 55 72 60,015 25,104 4,615 85,120 21,833 1,364 Amic Salarity Company HO Building 600	8	General Inst Bidg	800	1800	89	40	72	27,529	3,537	5,161	19,963	19,953	392	380
Enilated Pere Dining Fec Company Hole Building C	જ્રું જે		006	2200	89	ß	72	60,015	25,104	44,615	73,547	21,833	1,137	520
Enil Barractes w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 65,120 21,833 1,384 Company HO Building Enil Barractes w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 65,120 21,833 1,384 Company HO Building Book 2400 68 55 72 115,562 29,565 44,615 85,120 21,833 1,384 AMPIES Strack Bar Goo 2400 68 55 72 115,562 29,565 44,615 85,120 21,833 1,384 AMPIES Strack Bar Goo 2400 68 75 115,562 29,565 44,615 85,120 21,833 1,384 Outboard Montal Purpose NA NA<	208	Enlisted Pers Dining Fac Kitchen Ares - Scullery	0	2400	88	88	22	115,562	0	0	115,562	21,833	2,626	728
Enil Barractes w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,384 Company HO Building Company HO Building 600 1600 68 68 72 115,562 0 115,682 21,833 1,384 Altribund Claim Backs 600 1600 1600 68 68 72 115,562 0 115,682 21,833 1,384 Outdoor Swimming Pool NA And 72 115,562 0 115,682 21,833 2,826 Outdoor Swimming Pool NA	207	Eni Berracke w/o Dining	009	2200	88	R	22	60,015	25,104	44,615	85,120	21,833	1,364	728
AAFES Sinack Bar 600 1600 68 55 72 41,952 29,585 44,615 71,537 15,420 953 Auth/Drid Clinio w/ Beds 0 2400 68 68 72 115,562 0 115,562 21,833 2,626 Outhoor Summaring Pool NA NA 18 NA 18 NA 18,560 5,161 23,751 21,833 4,63 Physical Finess Center 1000 2100 68 55 72 60,015 25,104 44,615 86,120 21,833 4,53 En Barracke w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 86,120 21,833 4,54 Company HO Building 600 2200 68 55 72 60,015 25,104 44,615 86,120 21,833 1,364 Admin General Purpose 700 1700 68 55 72 33,664 33,833 44,615 60,531 15,	208	Eni Barracks w/o Dining Company HO Building	8	5200	88	55	22	60,015	25,104	44,615	85,120	21,833	1,364	728
Hith/Drift Clinic w/ Bede 0 2400 68 68 72 115.562 0 0 115.662 21/833 2 626 Outdoor Swimming Pool NA NA NA NA NA NA NA Outdoor Swimming Pool NA NA NA NA NA NA NA Prysical Filtress Center 1000 2100 65 40 72 18,590 5,161 2,161 2,161 23,751 21,833 4,53 Eni Barracks w/o Dilning 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HO Building 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HO Building 600 2200 68 55 72 33,664 33,833 44,615 85,120 21,833 1,364 Admin General Purpose 700 1700 68	82		99	1600	88	55	72	41.952	29.585	44 615	71.537	15.420	953	514
Outdoor Swimming Pool NA NA </th <th>210</th> <th>Hith/Dritt Clinic w/ Beds</th> <th>0</th> <th>2400</th> <th>88</th> <th>88</th> <th>72</th> <th>115,562</th> <th>0</th> <th>0</th> <th>115,562</th> <th>21,833</th> <th>2.626</th> <th>728</th>	210	Hith/Dritt Clinic w/ Beds	0	2400	88	88	72	115,562	0	0	115,562	21,833	2.626	728
Oymnaelum 1000 2100 65 40 72 18,590 5,161 23,751 21,833 453 Physical Fitness Center 1000 2100 65 40 72 18,590 5,161 23,751 21,833 453 Eni Barracka w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HO Building 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HO Building 600 2200 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 </th <th>211</th> <th>-</th> <th>¥</th> <th></th> <th></th> <th>ž</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>•</th> <th></th> <th></th>	211	-	¥			ž						•		
Physical Fitness Center 1000 2100 65 40 72 18,590 5,161 23,751 21,833 453 Eni Barracka w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HQ Building Company HQ Building 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HQ Building 600 2200 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,6	212	_	1000	2100	છ	\$	72	18,590	5,161	5,161	23,751	1	453	
Eni Barracte w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HQ Building Eni Barracte w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HQ Building Company HQ Building 600 2200 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72	219	$\overline{}$	1000	2100	65	\$	72	18,590	5,161	5,161	23,751	21,833	453	728
Eni Barracks w/o Dining 600 2200 68 55 72 60,015 25,104 44,615 85,120 21,833 1,364 Company HQ Building Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,8	228	Eni Barracks w/o Dining Company HQ Building	009	2200	8	SS.	72	60,015	25,104	44,615	85,120	21,833	1,364	728
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Process Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833	230 230A		009	2200	88	55	72	60,015	25,104	44,615	85,120	21,833	1,364	728
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Sig Photo Lab 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Process Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,6	235	Admin General Purpose	700	1700	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Sig Photo Lab 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Process Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	238	Admin General Purpose	700	1700	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Sig Photo Lab 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Processa Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	237	Admin General Purpose	700	1700	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 GM Facility 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	238	Sig Photo Lab Process	700	1700	88	R	72	33,064	33,833	44,615	60,531	15,420	95/	367
GM Facility 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	240	Admin General Purpose	700	1700	89	55	72	33,064	33,833		60,531	15,420	756	367
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756 Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	24	GM Facility	700	1700	88	જ	72	33,064	33,833		60,531	15,420	756	367
Admin General Purpose 700 1700 68 55 72 33,064 33,833 44,615 60,531 15,420 756	243	Admin General Purpose	700	1700	89	55	72	33,064	33,833		60,531	15,420	756	367
	244	Admin General Purpose	200	1700	88	જ	72	33,064	33,833	L	60,531	15,420	756	367

)8 1		Existing St	Schedule	Heating Season	ason	Cooling	Degree H	Degree Hours per Year, 7 Days/Wi	7 Days/Wk			FULL LOAD HOURS/YEAR	OURS/YEAR
ġ	Installation Name	ᄪ	Time	Setpoint	Setback	Setpoint	Heating	Heating	Heating Htg Settok	Total	Total	Heating	Cooling
		HVAC ON	N HVAC OF	Deg	P. B.	Deg	Š	Set-Back	Set-Back 7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
S 246	Admin General Purpose	200	1700	88	55	72	33,064	33,833	44,615	60,531	15,420	99.2	292
\$ 247	Admin General Purpose	82	1700	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
P 252	Vehicle Maint Shop DS	99	1600	જ	45	22	34,454	3,537	44,615	39,883	15,420	929	367
_	Vehicle Maint Shop ORG	909	1600	89	45	72	34,454	3,537	44,615	39,883	15,420	625	367
_	Vehicle Maint Shop ORG	8	1600	જુ	45	22	34,454	3,537	44,815	39,883	15,420	929	367
5 283	FE Maintenance Shop	200	1700	R	\$	22	10,781	4,287	5,161	12,238	15,420	288	367
\$ 286	Admin General Purpose	700	1600	88	જ	72	33,064	33,833	44,615	60,531	15,420	756	367
P 287	Recreation Building	1200	2100	88	55	72	18,027	41,783	44,615	59,809	20,692	410	069
	General Purpose Warehouse	ğ	1600	8	55	72	33,064	33,833	44,615	60,531	15,420	756	367
\$ 290	Electron Equip Facility	700	1600	88	જ	72	33,064	33,833	44,615	60,531	15,420	952	196
S 291	Cont Humid Warehouse	200	1600	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
P 295	Eni Barracks w/o Dining	900	2200	8	જ	72	60,015	25,104	44,615	85,120	21,833	1,364	87.
		ğ	L	8	જ	22	33,064	33,833	44,615	60,531	15,420	756	367
	Computer Room	•	2400	3	8	*	115,562	0	•	115,562	17,007	2,628	607
P 642	Detached Latrine/Shower	₹	₹	ž	₹	≨	Y.	AN N	NA NA	ž	¥	N	AN
2201	8 2201 Control Tower - Range SPT	15 dly Jan	en & Jul	88	OFF	72	5,137	0	0	5,137	1,610	125	š
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	TEXA BOILD	160,000,000		THE STATE OF THE PERSON OF THE	K	· ·				The second second	-					-	
2	Flendrich	Proposite	10	ECO Boy	Property Co	y cost savings		Non-Energy	y saving		Ison Cost		1000		Crite Cycle C	Te Cycle Cost Analysi	5
į	kWH/Yr	MII BTU/Yr	MI BTU/Yr	\$/Year		2 × × ×	_	Non-Egy S/Yr	\$ Total	Cost	Constr	Cost	Rebate	Invest	Savings	Simple	SIR
L	838	14.7	0.0	\$63		\$0	\$178	(88)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$2,302	1.12	11.913
P 41A	532	2.7	0.0	\$40		0\$	\$81	(15)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$753	6.45	1.948
200	818	2.4		473	700	5	623	(44)	16.4)	4034	4,07	11.5	4	4004	0104		1000
P 428	5	- i	9	£	•	•	2	Ē	Č.	*/7¢	\$427		084	1854	9/8\$	40.0 4	2.267
P 43A	618	3.1	0.0	2 <u>7</u>	\$24	Ç,	\$70	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$876	5.54	2.267
P 44A	618	3.1	0.0	2	\$24	S	\$70	(\$1)	(25)	\$274	\$427	\$477	06\$	\$387	\$876	5.54	2.267
P 45A	618	3.1	0.0	2	\$24	\$	\$70	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$876	5.54	2.267
P 46	522	2.9	0.0	6 23	\$23	\$	\$62	(88)	(\$87)	\$137	\$214	\$238	\$45	\$193	\$715	3.48	3.698
P 47	522	2.9	0.0	\$ 30	\$23	2	\$62	(\$\$)	(205)	\$137	\$214	\$238	2	\$193	\$715	3.48	3.698
P 61A P 518	618	3.1	0.0	ĭ		<u>\$</u>	\$70	<u>(f</u>	(\$7)	\$274	\$427	\$477	00\$	\$387	\$876	5.54	2.267
P 52A P 52B	618	3.1	0.0	22	\$24	<u>Q</u>	\$70	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$8\$8	5.54	2.267
P 53	522	2.9	0.0	\$30		S.	\$62	(9\$)	(\$67)	\$137	\$214	\$238	25	\$183	\$715	3.46	3.698
7	525	2.9	0.0	\$ 30		9	\$62	(\$\$)	(\$67)	\$137	\$214	\$238	24 5	\$193	\$715	3.48	3.698
P 55	522	2.9	0.0	8 30		0\$	\$62	(\$6)	(\$67)	\$137	\$214	\$238	243	\$183	\$715	3.46	3.698
P 56	522	2.9	0.0	838		\$0	\$62	(\$6)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$715	3.48	3.698
P 57	522	2.9	0.0	83		0\$	\$62	(\$6)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$715	3.48	3.698
P 58	522	2.9	0.0	2		ŝ	\$62	(\$8)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$715	3.46	3.698
P 59	522	2.9	0.0	82		8	\$62	(\$0	(\$67)	\$137	\$214	\$238	\$45	\$183	\$715	3.48	3.698
000	522	2.9	0.0	ŝ	\$23	0\$	\$62	9	(\$67)	\$137	\$214	\$238	\$25	\$193	\$715	3.46	3.698
2/2	•	•	•	'													
2 0	080	92.5	0.0	\$7/15	\$728	8	\$1,442	<u>(3</u>	(\$7)	\$171	\$267	\$297	\$40	\$257	\$18,659	0.18	72.489
	1000																
	28,041	0:0	0:0	\$ 2,080	<u>.</u>	9	\$2,090	(\$194)	(\$2,159)	\$5,483	\$8,521	\$9,501	\$1,280	\$8,221	\$22,296	4.34	2.712
P 14	276	0.0	0.0	\$21	0\$	0 \$	\$21	(\$6)	(\$87)	\$137	\$214	\$238	2	\$193	\$173	13.32	0.896
T 120	,	•	•	'	•	'	•										
T 121	186	9 :0	0.0	\$15	7.3	9	\$61	(1\$)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$820	6.42	2.122
T 124	2,215	61.3	0.0	\$165	\$48	0\$	\$648	(\$\$)	(\$87)	\$137	\$214	\$238	\$45	\$183	\$8,696	0.30	44.991
200	20 874	0000	. 6	, 100	ì		. 2206	10000	1007	0000	100	1		100	000	,	,
131	750	12.4		200,	4	2 5	41,007	(84)/e	(\$6.7)	\$0,302	068,830	1960	\$2,070	188,881	\$82,080 61 000	5	10.426
\$ 144		pesn				1	3		(104)	2	\$176	9530	2	2	008110	5.	0.100
8 146	1,022	12.2	0.0	\$76		0\$	\$172	(98)	(\$87)	\$308	\$480	\$538	\$85	\$451	\$2.183	2.71	4.845
T 149	1,012	36.5	0.0	\$78	\$287	2	\$363	98	(\$67)	\$137	\$214	\$238	25	\$193	\$4.883	0.54	25.263
T 156	ECO B6 Not Applicable	t Applicable				·	·				1						

Edo 86/4 Sheet 10 of 15

S	ECO 86/8/	ECO B6/B7 Energy Savings		ECO DO/D/ CHAIGN COST SAVITURE	- 70	חשר וואשר ופרו			-	COLINGIA COLINGIA				4	בווכ בלושוע הסכי נונול ביווים	Carry Con	
Š	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	Non-Egy	သ	Bare	Constr	Total	PG&E	Total	LCC,N=15	Simple	
	kWH/Yr	Mil BTU/Yr	Mii BTU/Yr	\$/Year	\$/Year	\$/Year	\$/Year	\$/Yr	\$ Total	Cost	Cost	Cost	Rebate	Invest	Savings	Payback	SIR
T 158	·			'	Ц		,										
T 181	2,006	12.3	0.0	\$150		0\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
T 162	2,006	12.3	0.0	\$150		3	\$246	(\$1)	(\$7)	\$274	\$427	\$477	\$30	\$387	\$3,113	1.57	8.054
T 163	2,006	12.3	0.0	\$150	\$97	0\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	\$30	\$387	\$3,113	1.57	8.054
T 164	2,008	12.3	0.0	\$150		0\$	\$246	(\$1)	(\$2)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
8	2,008	12.3	0.0	\$150		0\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	\$90	\$387	\$3,113	1.57	8.054
T 186	2,006	12.3	0.0	\$150	*	0\$	\$246	(1\$)	(2\$)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
T 187	2,006	12.3	0.0	\$150	283	0\$	\$248	(1\$)	(2\$)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
S 168		•	•	'	-	•	•										
T 172		'	•	'	-		,										
P 177	3,526	16.7	0.0	\$283	\$132	0\$	\$384	(\$8)	(\$87)	\$137	\$214	\$238	\$45	\$183	\$4,871	0.50	25.203
P 178	5,588	22.4	0.0	\$417	\$176	0.5	\$583	(9\$)	(\$67)	\$21	\$33	\$37	0\$	\$37	\$7,302	90.0	199.92
\$ 182	2.522	29.4	0.0	\$188	\$231	9	\$419	(88)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$5.405	0.47	27.965
8	3 197	85.5	0.0	\$238	\$282	05	\$520	3	(S7)	\$274	\$427	\$477	06\$	\$387	\$8 771	0.74	17.51
8			'	'		'											
6	Becommen	Becommend replacement of HVAC	Of HVAC	,	ľ		-										
	Central Plan	Central Plant equip thus N/A	W/Z	-													
S 198	c	00	0.0														
2000	100		402.0	5	9	62 450	£2 4KB	(CRK)	(8044)	£1 018	€2 002	£3 33R	6830	\$2 70R	\$32.010	1 14	12 183
205A		9	186.0	•	•	00,436	95,436	(20)	()	•	788'70	955'5	200	96,700	935,	:	
P 206				'	'												
P 207	105	0.0	492.0	\$8	2	\$2,450	\$2,458	(\$82)	(\$944)	\$1,918	\$2,992	\$3,336	\$630	\$2,708	\$32,910	1.14	12.163
P 207A																	
P 206 P 208A	105	0.0	492.0	8\$	O \$	\$2,450	\$2,458	(\$82)	(\$844)	\$16'1\$	\$2,992	9cc'c\$	\$630	\$2,706	\$32,910	1.14	12.163
P 209	11,449	6.9	0.0	\$853	\$54	8	\$908	(1.\$)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$10,747	0.43	27.803
P 210	-	•	•			-	•										
P 211	-		•		•	•	•										
P 212	1,238	321.0	0.0	\$92	\$2,528	\$0	\$2,619	(\$1)	(\$7)	\$274	\$427	\$477	06\$	286\$	\$36,845	0.15	95.318
P 219		•	•			4	_										
P 228 P 228A	105	0.0	482.0	\$	\$	\$2,450	\$2,458	(\$82)	(\$944)	\$1,918	\$2,892	\$3,336	\$630	\$2,706	\$32,910	1.14	12.163
P 230	105	0.0	492.0	8\$	<u>\$</u>	\$2,450	\$2,458	(\$82)	(\$844)	\$1,918	\$2,992	\$3,336	\$630	\$2,706	\$32,910	1.14	12.163
P 230A																	
\$ 235	1	•	•		-	٠	•										
S 236	-	•	•	•	1	٠	'										
\$ 237	•	٠	٠	•		•	1										
238	•	•	•		•	3	•										
240																	
2 241		-														-	
	•	•	•														
	•	•	٠														
\$ 243		•	•		'	٠											
1					-			-		-	,				1		

Eco 86/7 Sheet 110f 15

Fac	ECO 86/87	Fac ECO 86/87 Energy Savings	s.Du	ECO B6/I	ECO B6/B7 Energy Co	Cost Savings		Non-Energy Saving		Construction Cost	on Cost				Life Cycle C	Life Cycle Cost Analysis	
Š	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	Non-Egy	227	Bare	Constr	Total	PG&E	Total	LCC,N=15	Simple	
	kWH/Yr	MII BTU/Yr	Mil BTU/Yr	\$/Year	\$/Year	\$/Year	\$/Year	¥.	\$ Total	Cost	Cost	Cost	Rebate	Invest	Savings	Savings Payback	SIR
S 248			•		•	•	·										
\$ 247		٠	٠	_	•												
P 252	Already has	Aiready has T-Stats on Clocks	locks	1	-	•	•										
P 256	Already has	Aiready has T-Stats on Clocks	locks	<u>'</u>	-	•	•										
P 259	Already has	Aiready has T-Stats on Clocks	locks		٠	ľ											
8 283	57	23.0	0.0	*	\$ 181	0\$	\$185	(\$\$)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$2,545	1.08	13.170
\$ 286					·	ľ											
P 267	Aiready has	Aiready has T-Stats on Clocks	locks		•	·	•										
\$ 288		-	•			•											
S 280	9,292	305.4	0.0	\$693	\$2,403	0 \$	\$3,098	(\$24)	(\$270)	\$548	\$855	\$953	\$180	\$773	\$41,864	0.25	54.151
\$ 291	5,142	105.7	0.0	\$383	\$832	0\$	\$1,215	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$16,261	0.32	42.067
P 295	74,049	1,159.5	0.0	\$5,520	\$9,125	0\$	\$14,645	(\$728)	(\$8,095)	\$16,440	\$25,644	\$28,593	\$5,400	\$23,193	\$185,695	1.67	8.007
P 301	9,212	317.9	0.0	\$687	\$2,502	0\$	\$3,188	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$43,451	0.12	112.407
P 642							•										
8 2201			•			•	•										
Totals	215,801	3,399	2,460	\$16,065 \$26,7	\$26,748	\$12,251 \$55,064	\$55,084	(\$1,778)		(\$19,773) \$46,652		\$72,770 \$81,138	\$14,770 \$66,368	\$86,388	\$715,759	1.25	10.785
				Note: Above total		o not includ	• building	116 results	s do not include building 116 results which have an SIR < 1.0	In SIR < 1.	9.						

				Date Prepared		SHEET	OF
CONSTRUCTION COST EST	TAMI	E		February 1	993	12	15
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10			
Location					Code A	(no design compo	eted)
Fort Hunter-Liggett, California Engineer-Architect					}		
Keller & Gannon							
Drawing No.		Estimate	70		Checked	Ву	
ECO-B6/7 (T-Clock / Programmable Ts	tat)	RJB			BIH		
	Qu	antity Unit	Per	abor	Per	Aaterial	Total
Line Item	No. Units	Meas.	Unit	Total	Unit	Total	Cost
Building 6						<u> </u>	
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 6)							\$137
Building 41, 42, 43, 44, 45, 51 & 52, eac	ch						
24 Hour Auto T-Stat	_	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldgs 41, 42, 43, 44, 45, 51 &	52, ea	ach)					\$274
Buildings 46, 47, 53, 54, 55, 56, 57, 58,			h				
24 Hour Auto T-Stat		EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldgs 46, 47, 53, 54, 55, 56, 5	7, 58,	59 & E	0, each)				\$137
Building 101 Dining & Lounge Areas ar							
Time Clock & Wiring - Din/Lng		EA	\$51	\$102	\$120	\$239	\$341
Time Clock & Wiring - Dwellings		EA	\$51	\$1,534	\$120	\$3,587	\$5,121
Subtotal (Bldg 101 Dining & Lounge Ar	1		Ilina Unit			1	\$5,463
Building 116	T			i'			
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 116)	 ·						\$137
Building 121	-						
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 121)	-	-		7.	V		\$274
Building 124	-						
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
The state of the s	+	LA	402	- 402	7.00	0.00	\$137
Subtotal (Bidg 124)				 			V.U.
Building 128	46	EA	\$32	\$1,472	\$105	\$4,830	\$6,302
24 Hour Auto T-Stat Subtotal (Bidg 128)	40	L-/\	Ψ02	¥1,712	1.00	7.,000	\$6,302
							Ψ0,002
Building 131	-	E^	\$32	\$32	\$105	\$105	\$137
24 Hour Auto T-Stat	1 1	EA	\$32	902	Ψ105	\$105	\$137 \$137
Subtotal (Bldg 131)	 	 			 	 	Φ13 /
Building 146		C.A.	600	600	\$10F	\$105	\$137
24 Hour Auto T-Stat	1-1	EA	\$32	\$32	\$105		
Time Clock & Wiring	1	EA	\$51	\$51	\$120	\$120	\$171
Subtotal (Bldg 146)	 						\$308
	1	l	1	1	I	1	

				Date Prepared		SHEET	OF
CONSTRUCTION COST	ESTIMAT	E		February 1	1993	13	15
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for	Estimate	
Location Limited Energy Study				10 400 10	Code A	(no design comp	eted)
Fort Hunter-Liggett, California	<u>a</u>						
· Keller & Gannon							
Drawing No.		Estimate	or		Checked	Ву	
ECO-B6/7 (T-Clock / Programmab	le Tstat)	RJB		bor	BIH	Aaterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 149							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 149)							\$137
Buildings 161, 162, 163, 164, 165,	166 & 167.	each			•	<u> </u>	
24 Hour Auto T-Stat		EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldgs 161, 162, 163, 164			each)	1	<u> </u>		\$274
Building 177			,				- · · · · · · · · · · · · · · · · · · ·
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 177)							\$137
Building 178							
Reset Existing Timer	1	EA	\$16	\$16	\$5	\$5	\$21
Subtotal (Bldg 178)							\$21
Building 182							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 182)							\$137
Building 186							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 186)							\$274
Buildings 205, 207, 208, 229 & 230	each	<u> </u>			·	·	
24 Hour Auto T-Stat	14	EA	\$32	\$448	\$105	\$1,470	\$1,918
Subtotal (Bldgs 205, 207, 208, 229	& 230, ead	1	· · · · · ·		· · · · · · · · · · · · · · · · · · ·		\$1,918
Building 209							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 209)							\$274
Building 212							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 212)							\$274
Building 283							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 283)							\$137
Subtatal this Shoot including all t	wildings						\$12.800
Subtotal, this Sheet, including all b	ullulligs						\$12,899

				Date Prepared		SHEET	OF
CONSTRUCTION COST ES	TAMIT	Ε		February 1	1993	14	15
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10			
Location					Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimator			Checked	Ву	
ECO-B6/7 (T-Clock / Programmable -	Tstat)	RJB			BIH		
Line Item	No.	untity Unit	Per	abor	Per	Aaterial	Total
Line item	Units	Meas.	Unit	Total	Unit	Total	Cost
Building 290					<u> </u>		·
24 Hour Auto T-Stat	4	EA	\$32	\$128	\$105	\$420	\$548
Subtotal (Bldg 290)					<u> </u>		\$548
Building 291				<u> </u>	ļ		
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 291)							\$274
Building 80					<u> </u>	1	
Time Clock & Wiring	1	EA	\$51	\$51	\$120	\$120	\$171
Subtotal (Bldg 80)							\$171
Building 295							
24 Hour Auto T-Stat	120	EA	\$32	\$3,840	\$105	\$12,600	\$16,440
Subtotal (Bldg 295)							\$16,440
Building 301							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 301)				ļ	ļ		\$274
		<u>LL</u>		<u> L</u>	L	<u> </u>	
Subtotal, this sheet		T			T		\$17,707
		<u> </u>					A 40 700
Subtotal (ECO B-6/7)					 		\$46,788
Sales Tax 8%				ļ	-		\$3,743
Subtotal					ļ		\$50,531
Contractor O.H. & P. 30%		 			<u> </u>		\$15,159
Subtotal							\$65,690
Bond 1%					<u> </u>		\$657
Subtotal							\$66,347
Estimating Contingency 10%							\$6,635
Total Probable Construction Cost					<u> </u>	<u> </u>	\$72,982

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B6/7 Sheet 15 of 15

	Fort Hunter Ligg Install Time Clocks on Name: ECO#8	s/Programmable T-Stats	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
Analysis Date		1-0/1	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
1. Investment	Costs					
A. Construction	on Costs		\$72,770			
B. SIOH			\$4,002			
C. Design Co	st		\$4,366			
D. Total Cost	(1A+1B+1C)		\$81,139			
E. Salvage Va	lue of Existing Eq	uipment			\$0	_
	y Company Rebat	te			(\$14,770)	
G. Total Inves	tment (1D-1E-1F)					\$66,369
2. Energy Sav	rings (+)/Cost(-): R 85-3273-X Used	for Discount Factors				
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84	735.5	\$16,061		11.70	\$187,917
B. Dist	\$4.98	2,460.0	\$12,251		13.78	\$168,816
C. Propane	\$7.87	3,399.0	\$26,750		14.16	\$378,782
D. Demand	\$108.60	kW	\$0		11.70	\$0
E. Other				_		<u> </u>
F. Total			\$55,062			\$735,515
3. Non Energ	y Savings (+) or C	Cost (-):		•		
A Annual Dec			(\$1,778)			
A. Annual Red	factor (Table A)		(\$1,710)	•	11.12	
	d Savings/Cost (3/	A x 3A1)				(\$19,771)
B. Non Recur	ring Savings (+) o	r Cost (-)			•	
ltern	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.						
b.						
C.						
d. Total						
C Total Non E	nergy Discounted	Savings (3A2+3Bd4)			(\$19,771)	
4. Simple Pay	back 1G/(2F3+3A	+(3Bd1/Economic Life)):		1.2	Years
	iscounted Savings				\$715,743	
_	Investment Ratio (· · · · · ·			10.78	
7. Adjusted In	ternal Rate of Retu	ım (AIRR):			80.27%	
		A full must				

Engineers-Architects

COMPUTED BY TCASE	ECO B-8	PROJECT_16-403-10 FHL - EEAP
CHECKED BY 1973 DATE 1973 REV. 19	REPLACE INEFFICIENT	SHEET NO OF SHEETS
DESCRIPTION	OF ACTION	
REMOVE EX	BING COMPRESSUR/	CONDENSOR
	AND REPLACE WITH	
EFFICIENCY	INITS OF SIMILAR	Z TYPE
CONVERSION TO	WATER COOLED UNI	TS IS PRECLUDED
DUE TO WATE,	R SHORTAGE ON BAS	5 <u>E</u>
FACILITIES I	ATTACHED SPREADSH	EET PRINTOUTS
EVERGY SAVIN	JG CALCULATIONS	
HAS BEEN SIME RUNS THE EER HAVE BEEN OB OR FROM TEL	CICAL USAGE OF TO NULATED BY TRACE IS AND CO.P'S OF TAINED FROM MANG EPHONE CONVERSATION EER'S AND COP'S O	THESE UNITS HACTURES LITERATURE WITH MANUE
UNITS ARE BE NEW, READLY	AUDILABLE EQUIPM	NENTO COPS UR
	GS ARE BASED ON	
The state of the s	OLD AND NEW EER	
HIGHER EERS 1	auso saving on Ki	N DEMAND.
	•	

FORM 101-1/8

REVISED JUNE 93

SHEET 20F41

Fac No.	Installation Name	Unit	Existing	Existing	New	New		Demand
		Nominal	Cing Usage	Unit EER	Unit EER	Cing Usage	Savings	Savings
		Tonnage	(KWH/YR)			(KWH/YR)	(KWH/YR)	(KW)
197	Admin Bldg R&D - Office (1)	35	12,691	8.5	9.7	11,121	1,570	6.1
209	AAFES Snack Bar	18	24,297	7.5	9.7	18,786	5,511	6.5
		7.5	10,123	7.5	9.3	8,164	1,959	2.3
3 238	Sig Photo Lab	30	22,606	7.5	9.3	18,231	4,375	9.3
295	Enl Barracks w/o Dining	54	93,825	8.5	9.8	81,379	12,446	10.1
241	Electron Maint Shop	20	18,751	8.5	9.7	16,431	2,320	3.5
128	Officers Quarters Military	25	37,747	7.5	9.7	29,186	8,561	9.1
206	Enlisted Pers Dining Fac	40	49,146	7.5	9.7	37,999	11,147	14.5
2 101	Open Din Cons (Hacienda)	20	3,549	7.5	9.7	2,744	805	7.3
210	Hith/Dntl Clinic w/ Beds	25	28,404	8.0	9.3	24,434	3,970	5.2
3 290	Electron Equip Facility	25	4,843	7.5	9.3	3,906	937	7.7
205	Admin General Purpose	80	75,112	8.5	10.6	60,231	14,881	22.4
208	Enl Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
207	Enl Barracks w/o Dining	80	75,112	8.5	10.6	60,231	14,881	22.4
230	En! Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
229	Enl Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
81	Theater with Dressing Rm's	120	6,900	9.1	11.3	5,557	1,343	0.0
		40	2,300	8.5	11.4	1,715	585	0.0
301	ADP Building	60	18,832	8.5	10.8	14,821	4,011	18.0
	TOTALS (SIR's > 1.0)		546,770			443,147	103,623	164

Fac						Single Yea	r Savings	(2)	
No.	Annual	Life Cycle			Total		Year	LCC	Savings
	Cost	Cost	Capitol	PG&E	Invest	Savings	Saving	Savings	Investment
	Savings (\$)	Savings (\$)	Costs (\$)	Rebate	\$	\$	Occurs	\$	Ratio (SIR)
S 197	\$781	\$9,136	\$59,820	\$1,680	\$65,019	\$53,838	NA	NA	0.14
P 209	\$1,120	\$13,106	\$36,984	\$1,584	\$39,113	\$33,286	10	\$22,301	0.91
	\$398	\$4,660		\$540					
S 238	\$1,335	\$15,620	\$45,859	\$2,160	\$48,973	\$41,273	10	\$27,653	0.88
P 295	\$2,026	\$23,704	\$72,689	\$2,808	\$78,240	\$65,420	3	\$58,224	1.05
P 241	\$552	\$6,461	\$32,499	\$960	\$35,276	\$29,249	5	\$23,984	0.86
P 128	\$1,623	\$18,994	\$24,544	\$2,200	\$25,167	\$22,090	5	\$18,113	1.47
P 206	\$2,407	\$28,165	\$119,640	\$3,520	\$129,879	\$107,676	5	\$88,294	0.90
P 101	\$848	\$9,924	\$22,852	\$1,760	\$23,720	\$20,567	3	\$18,304	1.19
P 210	\$865	\$10,123	\$73,352	\$1,300	\$80,487	\$66,017	10	\$44,231	0.68
S 290	\$911	\$10,655	\$24,451	\$1,800	\$25,463	\$22,006	3	\$19,585	1.19
P 205	\$3,539	\$41,408	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.54
P 208	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 207	\$3,539	\$41,408	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.54
P 230	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 229	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 81	\$100	\$1,172	\$91,641	\$3,360	\$94,180	\$82,477	10	\$55,260	0.60
	\$44	\$510		\$4,640					
P 301	\$2,258	\$26,419	\$34,317	\$5,520	\$32,743	\$30,885	10	\$20,693	1.44
	\$25,545	\$298,880	\$400,158	\$19,688 -	\$426,488	\$360,142	-	\$298,243	1.40

NOTES:

- 1. Building 197 is scheduled for a complete renovation , including HVAC system. ECO Project for this building is withdrawa
- Single year (Non-recurring, non-energy) cost savings represent the avoided cost of replacing units at the ends of their useful lifetimes. Remaining lifetimes, shown by "year of savings" are DEH maintenance worker opinions based on years of experience maintaining the equipment.

CONCERNION COST FORM	CONSTRUCTION COST ESTIMATE								
CONSTRUCTION COST ESTI	WAIE			February 1					
roject .				Project No.	Basis for E	stimat o			
EEAP Limited Energy Study				<u> </u>	Code A	(no design competed	ກ		
Fort Hunter-Liggett, California						(J	•		
Engineer-Architect					1				
Keller & Gannon	_								
Drawing No.		Estimator			Checked E	>			
ECO B-8 CHILLER REPLCMT BLDG 197	Cita	intity		Labor	- N	laterial			
Une hem	No.	Unit	Per		Per Unit	Total	Total		
	Units	Moss.	Unit	Total	Unit	1004	COST -		
	 	EA		\$1,000	 	\$0	\$1,000		
Demolish existing unit		EA		\$1,000		40	Ψ1,000		
	+			\$5.250	 	\$32,100	\$37,350		
Provide & Install Packaged 35 ton unit	1	EA		\$5,250		\$32,100	\$57,550		
						 			
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				<u> </u>					
						<u> </u>			
Subtotal							\$38,350		
Sales Tax @ 8%							\$3,068		
Subtotal							\$41,418		
Contractor OH & Profit @ 30%	 						\$12,42		
Subtotal		1					\$53,843		
	+				1		\$53		
Bond @ 1%	+					 	\$54,382		
Subtotal		-		<u> </u>	-	 	\$5,43		
Estimating Contingency @ 10% Total Probable Construction Cost	4	 		 	-	 	\$59,820		

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CONSTRUCTION COST ESTI	MATE			February 1	993	Sheet Of	41
Project				Project No.	Basis for E	stimate	
EEAP Limited Energy Study					Sara A (na desina aomasta	-n
Fort Hunter-Liggett, California					Coose	no design compete	- ,
Engineer-Architect					†		
Keller & Gannon							
Drawing No.		Estimator			Checked B	Y	
ECO B-8 CHILLER REPLCMT BLDG 209	Que	ntity	1	Labor	M	eterial	
Line Nem	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total ≠ Cost
					ļ		
Demolish existing unit	2	EA	\$810	\$1,620	-	\$0	\$1,620
						A12	A
Provide & Install Packaged 18 ton unit	1 1	EA	-	\$2,200	ļ <u> </u>	\$12,700	\$14,900
	-			4000	ļ	#C CCC	67.400
Provide & Install Packaged 7.5 ton unit	1 1	EA	•	\$990	-	\$6,200	\$7,190
	-						
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	1						***************************************
	+						
Subtotal	1						\$23,710
Sales Tax @ 8%	1						\$1,897
Subtotal	+						\$25,607
Contractor OH & Profit @ 30%							\$7,682
Subtotal	1						\$33,289
Bond @ 1%	1						\$333
Subtotal							\$33,622
Estimating Contingency @ 10%							\$3,362
Total Probable Construction Cost	†						\$36,984

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				Date Prepared		Sheet Of	
CONSTRUCTION COST EST	MATE			February 1		5	4/
Project EEAP Limited Energy Study				Project No.	Besis for E		at.
Fort Hunter-Liggett, California					Code A	(no design compete	<u>.,</u>
Engineer-Architect Keller & Gannon							
Drawing No.		Estimator			Checked B	ey .	-
ECO B-8 CHILLER REPLCMT BLDG 238	I Que	ntity		Labor	M	laterial	
Line item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total
	1	EA		\$1,000	-	\$0	\$1,000
Demolish existing unit		EA		\$1,000			41,000
Provide & Install Packaged 30 ton unit	1	EA	•	\$3,800	-	\$24,600	\$28,400
					<u> </u>		
		<u> </u>	<u> </u>		-		
	-	 					
		<u> </u>			 		
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		-		 	<u> </u>		
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		 	-				
					<u> </u>		
					 		400:400
Subtotal		<u> </u>			 		\$29,400 \$2,352
Sales Tax @ 8%			:		 		\$31,752
Subtotal		 			 		\$9,526
Contractor OH & Profit @ 30%			1 10		+		\$41,278
Subtotal Subtotal					-		\$413
Bond @ 1% Subtotal	-	-	-		 	† †	\$41,690
Estimating Contingency @ 10%	+-		100				\$4,169
Total Probable Construction Cost		T		1			\$45,859

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CONSTRUCTION COST EST	IMATE			Pebruary 1	993	41	
Project				Project No.	Basis for E	stimate	
EEAP Limited Energy Study							
ccation					Code A (no design compete	d)
Fort Hunter-Liggett, California Engineer-Architect					ł		
Keller & Gannon							
Drawing No.'		Estimetor			Checked B	y	
ECO B-8 CHILLER REPLCMT BLDG 295				Labor	<u> </u>	aterial	
Line Nem	Qua No.	Unit	Per	T	Per	T	Total =
	Units	Meas.	Unit	Total	Unit	Total	Cost -
Dana dia basilatia a socia	+-	EA		\$1,250		\$0	\$1,250
Demolish existing unit	1	EA	-	\$1,250	 - -	\$0	\$1,250
Provide 9 Install Backgroup 50 ton unit	1	EA		\$6,450	-	\$38,900	\$45,350
Provide & Install Packaged 50 ton unit		<u> </u>	-	\$0,450		Ψ00,300	Ψτο,σου
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				1			
							·
Subtotal							\$46,600
Sales Tax @ 8%							\$3,728
Subtotal		 					\$50,328
Contractor OH & Profit @ 30%		 					\$15,098
Subtotal							\$65,426
Bond @ 1%							\$654
Subtotal							\$66,081
Estimating Contingency @ 10%							\$6,608
Total Probable Construction Cost	1						\$72,689

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CONSTRUCTION COST ESTI	MATE			Pebruary 1	993	Sheet Of	41
				Project No.	Basis for E	etimete	
Project				Project No.			
EEAP Limited Energy Study				I	Code A (na design competed	1)
Fort Hunter-Liggett, California]		
Engineer-Architect					ł		
Keller & Gannon		Estimetor		·	Checked B	Y	
Drawing No. ECO B-8 CHILLER REPLOMT BLDG 241						•	
ECO B-8 CHILLER REF COMT BEDG 241		ntity		Labor		aterial	Total =
Line Nem	No. Unite	Unit Meas.	Per Unit	Total	Per Unit	Total	Cost
Demolish existing unit	1	EA		\$810	-	\$0	\$810
Demonstrating diffe							
Provide & Install Packaged 20 ton unit	1	EA	•	\$2,625	-	\$17,400	\$20,025
TOTAL CHICAMIT CONTEST TO SOME							
	_						
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	_						
	 						
		 					
Subtotal							\$20,835
Sales Tax @ 8%				1		†	\$1,667
Subtotal							\$22,502
Contractor OH & Profit @ 30%		1					\$6,751
Subtotal	_	 			 		\$29,252
	_						\$293
Bond @ 1% Subtotal							\$29,545
		+					\$2,954
Estimating Contingency @ 10% Total Probable Construction Cost		+		 	 	 	\$32,499

				Date Prepared		Sheet Of				
CONSTRUCTION COST ESTIN	IATE			February 1	993	8	41			
Project				Project No.	Basis for E	stimate				
EEAP Limited Energy Study										
Location					Code A	no design compete	9)			
Fort Hunter-Liggett, California Engineer-Architect					4					
Keller & Gannon										
Drawing No.		Estimeto	7		Checked E	Y				
ECO B-8 CHILLER REPLCMT BLDG 128										
Line Nem	No.	ntity Unit	Per	Labor	Material Total -					
	Units	Meas.	Unik	Total	Unit	Total	Cost -			
	 									
Demolish existing unit	1 1	EA	-	\$810	<u> </u>	\$0	\$810			
Provide & Install 25 ton Air Cooled	1 1	EA	-	\$2,625	<u> </u>	\$12,300	\$14,925			
DX unit										
	1									
	1									
	1									
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Subtotal							\$15,735			
Sales Tax @ 8%							\$1,259			
Subtotal							\$16,994			
Contractor OH & Profit @ 30%							\$5,098			
Subtotal							\$22,092			
Bond @ 1%							\$221			
Subtotal							\$22,313			
Estimating Contingency @ 10%							\$2,231			
Total Probable Construction Cost							\$24,544			

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				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTIM	ATE			February	1993	9	41
Project			<u>.</u>	Project No.	Basis for Estim	ate	
EEAP Limited Energy Study							
Location	•				Code A (no c	tesign competed)
Fort Hunter-Liggett, California					1		
Keller & Gannon							
Drawing No.		Estimato	,		Checked By		
ECO B-8 CHILLER REPLCMT BLDG 206	,			abor	Materi	-4	
Line Item	No.	Unit	Per		Per		Total
	Units	Meas.	Unit	Total	Unit	Total	Cost
			21 222	20.000		**	\$0.00
Demolish existing unit	2	EA	\$1,000	\$2,000	-	\$0	\$2,000
			1	010.500	000 100	CC4 CCC	674 70
Provide & Install Packaged 40 ton unit	2	EA	\$5,250	\$10,500	\$32,100	\$64,200	\$74,70
		 					
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							A=0 ==
Subtotal							\$76,70
Sales Tax @ 8%							\$6,13
Subtotal							\$82,83
Contractor OH & Profit @ 30%							\$24,85
Subtotal							\$107,68
Bond @ 1%							\$1,07
Subtotal							\$108,76
Estimating Contingency @ 10%							\$10,87
Total Probable Construction Cost	 	 	 				\$119,64

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				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTIN	JATE			February	1993	10	4/
Project				Project No.	Basis for Estim	ate	
EEAP Limited Energy Study							
Location					Code A (no d	deeign competed)	
Fort Hunter-Liggett, California					{		
Keller & Gannon							
Drawing No.		Estimeto	•		Checked By		
ECO B-8 CHILLER REPLCMT BLDG 101	T 0:-	ntity		abor	Mater	<u> </u>	
Line Nem	No.	Unit	Per	T	Per	Total ·-	
	Units	Meas.	Unit	Total	Unit	Total	Coet
Dama link	1	EA	\$750	\$750	-	\$0	\$750
Demolish existing unit	+	EX	\$750	\$750	-	Ψ0	4/30
Provide & Install 00 ten Air Casled	1	EA	\$2,400	\$2,400	\$11,500	\$11,500	\$13,900
Provide & Install 20 ton Air Cooled DX unit		12.4	Ψ2,400	Ψ2,400	ψ11,000	\$11,500	Ψ10,300
DX unit	+	-					***************************************
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Cubtatal							\$14,650
Subtotal	+	 					\$1,172
Sales Tax @ 8% Subtotal						 	\$15,822
	-						\$4,747
Contractor OH & Profit @ 30% Subtotal							\$20,569
	 						\$206
Bond @ 1% Subtotal							\$20,774
	-						\$2,077
Estimating Contingency @ 10%	-						
Total Probable Construction Cost	<u> </u>						\$22,852

				Date Prepared		Sheet Of	
CONSTRUCTION COST EST	IMATE			February	1993 4/		
Project	Project No. Basis for Estimate						
EEAP Limited Energy Study							
ocation					Code A (no	design competed)	
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon		Estimato	·		Checked By		
DIAMOND NO. ECO B-8 CHILLER REPLOMT BLDG 210	,				,		
ECO B-8 CHILLER REFLORIT BEBU 210	Qua	ntity	<u> </u>	abor	Mater		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Demolish existing unit	3	EA	\$750	\$2,250	-	\$0	\$2,250
Demonshi existing time		-		, , , , , , , , , , , , , , , , , , ,			
Provide & Install 25 ton Air Cooled	3	EA	\$2,625	\$7,875	\$12,300	\$36,900	\$44,775
		 	72,020	7.,0.0	7.2,223	1 1	
DX unit	-		 			-	
	-+-	-		 			
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						 	A (2.00)
Subtotal							\$47,025
Sales Tax @ 8%							\$3,762
Subtotal							\$50,787
Contractor OH & Profit @ 30%							\$15,236
Subtotal							\$68,023
Bond @ 1%							\$680
Subtotal							\$66,683
							\$6,668
Estimating Contingency @ 10% Total Probable Construction Cost			-			-	\$73,352

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CONSTRUCTION COST ESTIMATE					1993	993 Sheet Of 12 41			
Project EEAP Limited Energy Study	Basis for Estim								
Location Fort Hunter-Liggett, California Engineer-Architect		Code A (no design competed)							
Keller & Gannon									
Crawing No. Estimetor			7	Checked By					
ECO B-8 CHILLER REPLCMT BLDG 290				sbor	Material				
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total ass Cost		
Demolish existing unit	1	EA	\$750	\$750	•	\$0	\$750		
Provide & Install 25 ton Air Cooled	1	EA	\$2,625	\$2,625	\$12,300	\$12,300	\$14,925		
DX unit					<u> </u>				
	†								
		-							
	 								
	-								
	ļ								
Subtotal	1						\$15,675		
ales Tax @ 8%							\$1,254		
Subtotal							\$16,929		
Contractor OH & Profit @ 30%						<u> </u>	\$5,079		
Subtotal							\$22,008		
lond @ 1%							\$220		
Subtotal							\$22,228		
stimating Contingency @ 10%							\$2,223		
Total Probable Construction Cost							\$24,451		

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	Date Prepared		Sheet Of				
CONSTRUCTION COST ESTIMATE				February	1993	13	41
roject				Project No.	Basis for Estim	ete	
EEAP Limited Energy Study		Code A (no design competed)					
ocation Collingia							
Fort Hunter-Liggett, California							
Keller & Gannon							
Drawing No.		Checked By					
ECO B-8 CHILLER REPLCMT BLDG 205		naty	1 4	bor	Material		
Line Nam	No. Units	Unit Mees.	P er Unit	Total	Per Unit	Total	Total Cost
			4750	\$750		02	\$750
Demolish existing unit	1	EA	\$750	\$750		\$0	\$750
Provide & Install 80 ton Air Cooled	1	EA	\$2,625	\$2,625	\$25,000	\$25,000	\$27,625
DX unit	1			_			
DA GIII.							
Note: This cost estimate is the same							
for BLDG'S 208, 207, 230, 229	+-			-			
or BLDG S 206, 207, 230, 229	+	<u> </u>					
		 					
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	├ ─	 					
	+				 		\$28,375
Subtotal	+-	 			 		\$2,270
Sales Tax @ 8%	 	ļ					\$30,645
Subtotal	 						\$9,194
Contractor OH & Profit @ 30%	+	<u> </u>					\$39,839
Subtotal	 	-					\$398 \$398
Bond @ 1%	-	<u> </u>					\$40,237
Subtotal	 	 			 		
Estimating Contingency @ 10%		 	ļ				\$4,024
Total Probable Construction Cost		1	i		l	<u> </u>	\$44,261

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				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTI	MATE			February	1993	14	41
Project				Project No.	Basis for Estim	ate	
EEAP Limited Energy Study							
Location Food Human Aircraft Colifornia					Code A (no d	design competed)	
Fort Hunter-Liggett, California					1		
Keller & Gannon							
Drawing No.		Estimeto	r		Checked By		
ECO B-8 CHILLER REPLOMT BLDG 81	1 0:-	intity	1	abor	Mater		
Line Nem	No.	Unit	Per		Per		Total -
	Units	Mess.	Unit	Total	Unit	Total	Coet
Dan Bak and Maranaik	2	EA	\$1,000	\$2,000	_	\$0	\$2,000
Demolish existing unit	- 2	EA	\$1,000	\$2,000	-	401	φ2,000
Provide & Install 120 ton Air Cooled	1	EA	\$3,250	\$3,250	\$37,500	\$37,500	\$40,750
DX unit	- '-		φυ,200	Ψ3,230	, 407,300	407,300	Ψ+0,130
Provide & Install 40 ton Air Cooled	1	EA	\$2,400	\$2,400	\$13,600	\$13,600	\$16,000
		<u> </u>	\$2,400	Ψ2,400	ψ10,000	\$13,000	\$10,000
DX unit	-	 	-				
		├		<u> </u>			
		\vdash					
			 				
	-	 					
			<u> </u>				
		 -					
	-			<u> </u>			
	+						
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	+-						
	-						
		 -					
Outhord							\$58,750
Subtotal Substitution Conference							\$4,700
Sales Tax @ 8%	+						\$63,450
Subtotal							\$19,035
Contractor OH & Profit @ 30%							\$82,485
Subtotal	-						\$825
Bond @ 1%	_						\$83,310
Subtotal							\$8,331
Estimating Contingency @ 10%							
Total Probable Construction Cost							\$91,641

ruary 1993	15 ate	41_
	ate	
Code A (no c	lesign competed)	
Checked By		
	ial	7-4-1
Unit	Total	Total Cost
,000 -	\$0	\$1,000
100 \$18,900	\$18,900	\$21,000
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	410,000	421,00
		<u></u>
		
		
		\$22,00
		\$1,76
		\$23,76
		\$7,12
		\$30,88
		\$30
		\$31,19
		\$3,12
		\$34,31
	Checked By Mater Per Unit	Checked By Material Per Unit Total ,000 - \$0

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

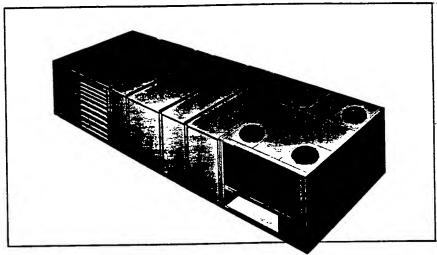
ECO_{B-8} Sheet 16 of 41

Project No. 16-403-10

Region No. 4 Fort Hunter Liggett, California Location: Fiscal Year FY96 Project Title: Chiller Replacement Discrete Portion Name: ECO# B-8 Preparer: KELLER & GANNON 15 YEARS Economic Life: Analysis Date: June 1993 1. Investment Costs \$400,158 A. Construction Costs \$22,009 B. SIOH \$24,009 C. Design Cost \$446,176 D. Total Cost (1A+1B+1C) \$0 E. Salvage Value of Existing Equipment \$19,688 F. Public Utility Company Rebate \$426,488 G. Total Investment (1D-1E-1F) 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discounted Discount Annual \$ Saving Cost Energy Factor(4) Savings(5) Savings(3) MBTU/YR(2) \$/MTBU/(1) Source \$90,371 \$7,724 11.70 353.7 \$21.84 A. Elec. \$0 13.78 \$0 0.0 \$4.98 B. Dist 14.16 \$0 \$0 \$7.87 0.0 C. Propane 11.70 \$208,508 \$17,821 164.1 D. Demand \$108.60 E. Other \$298.880 \$25,545 F. Total 3. Non Energy Savings (+) or Cost (-): \$0 A. Annual Recurring (+/-) 11.12 (1) Discount Factor (Table A) \$0 (2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Discounted Sav-Discount Year of Savings(+) Item ings(+)Cost(-)(4)Factor(3) Cost(-)(1) Occur. (2) 0.89 \$96,114 3 \$107,993 a. \$181,437 0.82 -5 \$221,264 b. \$20,693 10 0.67 \$30,885 c. \$298,243 \$360,142 d. Total \$298,243 C Total Non Energy Discounted Savings (3A2+3Bd4) 8.6 Years 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): \$597,123 5. Total Net Discounted Savings (2F5+3C): 1.40 6. Savings to Investment Ratio (SIR) 5/1G: 9.92 %

7. Adjusted Internal Rate of Return (AIRR):

Catalog 205-4



BLOG 238, 31 Tons unit

Roofpak:
Single Zone:
Heating & Cooling:
Units:

Type RPS Sizes 18-120 tons



Physical data

TABLE 1

RPS Unit Size	018B	0208	025B	0308	036B
Nominal Capacity (tons)*	17.7	20.4	25.6	30.1	34.8
Nominal CFM	7,000	8,000	10,000	12,000	14,000
Compressor					
Туре		A	ccessible Semi-Hermet	ic	
Number-HP	1-20	1-25	1-30	1-35	1-40
Number of Cylinders	4	4	6	6	6
Capacity Control (Std.)	100/50/0	100/50/0	100/66/0	100/66/0	100/66/0
Optional Capacity Control (1)	-	_	100/66/33/0	100/66/33/0	100/66/33/0
Evaporator Section					
Number of Rows Std. (Opt.)	2(3, 4, 5)	2(3, 4, 5)	2(3, 4, 5)	2(3, 4, 5)	3(4, 5)
Face Area (sq. ft.)	18.8	18.8	27.3	27.3	27.3
Supply Air Fans					•
Туре		Low	Pressure, Forward Cu	rved	
Number-Diameter (in.)	2-15	2-15	2-15	2-15	1-24
CFM Range	4,000-12,000	5,600-12,000	5,600-16,000	5,600-16,000	11,200-17,700
Туре		Medius	m Pressure, Forward (
Number-Diameter (in.)		_	-		1-24
CFM Range	_	_	_	-	11,200-17,700
Type		Low-M	edium Pressure, Airfoi	or Backward Curve	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Number-Diameter (in.)	-	_	-	-	1-24
CFM Range	-	_		_	11,200-17,700
Condenser Coil					
Circuits/Rows	1/2	1/2	1/3	1/3	1/2
Face Area (sq. ft.)	42.2	42.2	42.2	42.2	62.5
Condenser Fan					
Туре			Propeller		
Number-Diameter (in.)	2-26	2-26	3-26	3-26	4-26
CFM Std.	17,040	17,040	23,700	23,700	32,720
Condenser Fan Motor					
Number-HP	2-1.5	2-1.5	3-1.5	3-1.5	4-1.5
Speed (RPM)	1140	1140	1140	1140	1140
Drive ·			Direct Drive		
Water Heating Coils					
Туре			Capacity Coil-1/2"		
Fins/Rows	12/1	12/1	12/1	12/1	12/1
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Type			Capacity Coil-1/2"		
Fins/Rows	12/2	12/2	12/2	12/2	12/2
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Steem Heating Coils					
Type			Coil-1" O.D., Jet Dis		
Fins/Rows	6/1	6/1	6/1	6/1	6/1
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Type			Coil-1" O.D., Jet Dis		
Fins/Rows	12/1	12/1	12/1	12/1	12/1
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Natural Gas or Oil Furnace					
Input (MBH)	 		500; 625; 800; 812; 9		
Output (MBH) Furnace Size		** 200; 250; 320;	400; 500; 640; 650;	790; 800; 1000	
Filters (Std.)					
Area (sq. ft.)	52.7	52.7	52.7	52.7	52.7
Number-Size (in.)	<u> </u>		16 x 25 x 2, 5-16 x 20		
Optional Filters		0 · · 1.	· //.~		
Type			45% Bag Filters		
Number-Size (in.)	 	4-24	x 24 x 22, 4-12 x 24	x 22	
Туре	<u> </u>		95% Bag Filters		
Number-Size (in.)	 		× 24 × 35, 4-12 × 24		
Type	 		-Filters (For Bag Filte		
Number-Size (in.)		4-2	4 x 24 x 2, 4-12 x 24	x 2	
Optional Return Air Fans		3			
Type	 	Lov	v Pressure Forward Cu		
Number-Diameter (in.)	2-15	2-15	2-15	2-15	Select Airfoil
Standard CFM	5,600	6,400	8,000	9,600	
Number Discours (in)			v-Medium Pressure Air		T
Number-Diameter (in.)		_		<u> </u>	1-40 x 14
Standard CFM				_	11,200
Connections	1 14 20	1 14	14. 50		
Discharge Duct	14 x 78	14 x 78	14 x 78	14 x 78	18 x 78
Bottom Return Duct	20 x 82	20 x 82	20 x 82	20 x 82	•••
Back Return	15 5/8 x 90	15 5/8 x 90	15 5/8 x 90	15 5/8 × 90	****



^{**}Furnace size availability is limited by minimum CFM requirement per table 21A on page 81.
**Without return fan: 24 x 82"; with return fan: 36 x 78".

^{****}Not available on units with return fan. Back return dimensions without return fan is 15 5/8 x 90".

Unit size 030B

	EI	VT.::						AIR TE	MPERAT	TURE (F)			
UNIT DATA		IR - MP.≕	**************************************	85.4	No.		95	6.		105			115	-
	DB	WB	TH	SH :	KW	THES		KW	TH	SH	KW	TH	SH	KV
	75	71 67	397	167	33.2	378 353	201	35.8 34.4	358	152	38.5 37.0	314	***	***
	' '	63	***	***	****	329	242	33.1	312	234	35.6	292	185	39.
RPS-030B		71	396	215	33.2	377	208	35.8	357	200	38.5	***	***	***
10,000 CFM	80	67	370	256	31.9	352	249	34.4	333	241	37.0	313	233	39.
10,000 01 111		63 71	396	263	33.2	329 377	289 256	33.1	311	281	35.6	293	272	38.
2-ROW EVAP.	85	67	370	304	31.9	351	297	35.8	357	248 289	38.4	***	281	39.
CTD 0011	"	63	***	***	****	332	327	33.3	317	317	36.0	302	302	38.
STD. COIL		71	395	311	33.1	376	304	35.7	356	296	38.4	***	***	***
	90	67	371	349	32.0	354 348	340	34.5	336	328	37.2	319	319	40.
		63 71	362 408	362 174	31.5	387	167	34.2	334	159	37.0 39.0	318	318	¥**
en en en en en en en en en en en en en e	75	67	381	222	32.4	362	215	34.9	342	207	37.5	321	199	40.
		63	356	270	31.2	337	262	33.6	319	254	36.1	300	246	38.
RPS-030B		71	407	230	33-7	387	223	36.3	366	216	39.0	***	***	***
40.000.0514	80	67	381	278	32.4	361	271	34.9	341	263	37.5	321	255	40.
12,000 CFM		63	356 407	325 287	31.2	339	279	33.7	321	307 272	36.2	302	296	38
2-ROW EVAP.	85	67	380	334	32.4	362	326	35.0	342	317	37.6	323	307	40
	Ľ	63	364	364	31.6	350	350	34.3	334	334	37.0	318	318	40.
STD. COIL		71	406	343	33.6	387	335	36.3	366	327	39.0	***	***	**
	90	67	385	378	32.7	369	369	35.3	353	353	38.2	***	***	***
•		63 71	384	384 181	32.6	369 395	174	35.3	353	353 166	38.2	***	***	***
الاردان الله المستخدم المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة المراجعة	75	67	388	235	32.8	369	228	35.3	348	220	37.9	327	212	40
	'	63	363	289	31.6	344	281	34.0	325	274	36.5	305	265	39
RPS-030B		71	415	245	34.0	394	238	36.7	372	230	39.3	***	***	**
14,000 CFM	80	67	388	299	32.8	368	292	35.3	348	284	37.9	327	276	40
14,000 CFM		63 71	365 414	349 309	31.7	348	339	34.2	330	326	36.8	312	312	39.
2-ROW EVAP.	85	67	389	361	32.9	371	352	36.6 35.4	372	294 341	39.3 38.1	***	***	***
por agrandan		63	380	380	32.4	365	365	35.1	348	348	37.9	***	***	***
STD. COIL		71	416	372	34.1	395	363	36.7	375	354	39.5	***	***	**
	90	67	401	401	33.4	385	385	36.2	368	368	39.1	***	***	***
	 	71	401	172	33.4	385	385 164	36.4	368	368	39.1	***	***	**
200	75	67	382	212	32.5	363	204	35.0	344	156 196	39.1 37.6	323	188	40.
<u></u>		63	356	252	31.2	339	245	33.7	320	236	36.2	301	228	38.
RPS-030B		71	410	219	33.8	390	211	36.4	369	204	39.1	***	***	***
	80	67	382	260	32.5	363 338	252	35.0	343	244	37.6	323	236	40.
10,000 CFM		71	356 409	300 267	31.2	389	259	33.7	320	284 251	36.2	301	275	38.
3-ROW EVAP.	85	67	381	307	32.4	363	299	35.0	343	291	37.6	323	283	40
The second second	L	63	358	345	31.3	341	335	33.8	325	325	36.5	308	308	39
		71	409	314	33.8	389	306	30.4	368	298	39.1	***	***	**
	90	67	382	354 371	32.5	364 356	345 356	35.1	346	335	37.8	***	***	***
	 	63 71	422	179	34.4	401	171	34.7	341	341 163	37.5 39.7	325	325	40.
A	75	67	393	226	33.0	374	218	35.6	353	210	38.2	***	***	***
		63	367	273	31.8	349	265	34.2	329	257	36.7	309	248	39
RPS-030B		71	422	234	34.3	400	227	37.0	378	219	39.7	***	***	***
Aro-usub	80	67	393	282 328	33.0	373	274 320	35.6 34.3	352 330	266 311	38.2 36.8	310	*** 300	39
12,000 CFM		71	421	290	34.3	400	282	37.0	378	274	39.7	***	***	**
	85	67	393	337	33.0	374	329	35.6	353	321	38.2	***	***	***
3-ROW EVAP.		63	374	374	32.1	358	358	34.7	342	342	37.5	325	325	40
	90	71 67	421 397	346 387	34.3	400 379	338 379	36.9 35.9	378 361	330 361	39.7	***	***	***
-	"	63	393	393	33.0	378	378	35.8	361	361	38.7 38.7	***	***	**
مينوب د	1	71	431	186	34.8	409	178	37.4	386	170	40.1	***	***	***
三克.	75	67	402	239	33.5	382	231	36.0	360	223	38.6	***	***	***
·	<u> </u>	63	375	292	32.2	356	284	34.6	336	276	37.1	315	267	39
RPS-030B	80	71 67	431	249	34.8	409 381	241 295	37.4	385	233	40-1	***	***	**
14 000 CEM	"	63	376	354	33.4	358	344	36.0 34.7	360	286 332	38.6 37.4	320	320	40
14,000 CFM		71	430	312	34.7	409	305	37.4	385	296	40.1	***	***	***
3-ROW EVAP.	85	67	403	365	33.5	382	356	36.0	362	346	38.7	***	***	***
	-	63	391	391	32.9	374	374	35.6	357	357	38.5	***	***	***
	90	67	431	375	34.7	409 395	367 395	37.4	386 378	358 378	40.2 39.6	***	***	***
								. 3041	2 / 5	/8	2740	1 777		7 7 7 7

66



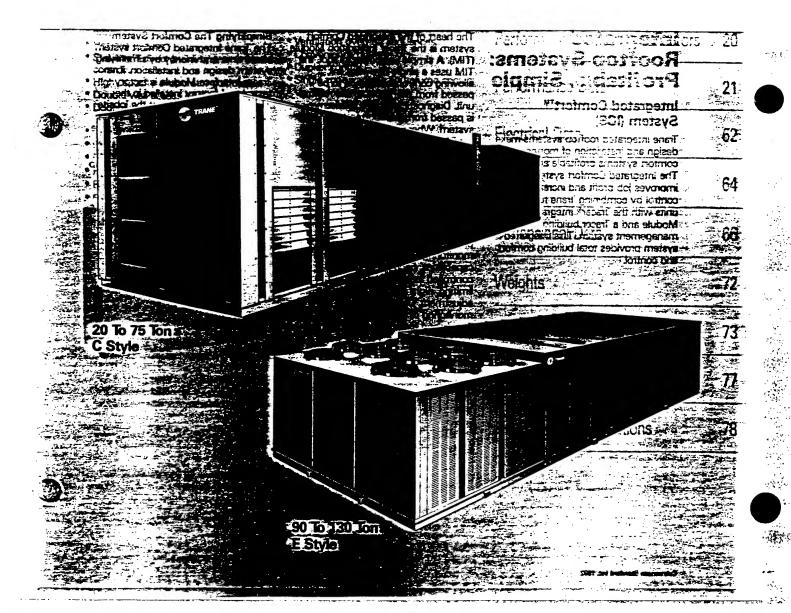
20 OF 41 ECO B-8

RT-DS-1 November 1992

First Printing

Packaged Rooftop Air Conditioners BLDG 206

20 To 130-Tons C and E Style





Model Number **Description**

DIGIT 11 - EXHAUST

2 = 100%, 11/2 HP A = 50%, 11/2 HP

5 = 100%, 71/2 HP D = 50%, 71/2 HP

DIGIT 12 - EXHAUST AIR FAN DRIVE

SELECTION

= Barometric

3 = 100%, 3 HP

4 = 100%, 5 HP

6 = 100%, 10 HP

0 = None

0 = None

4 = 400 RPM

5 = 500 RPM

6 = 600 RPM

7 = 700 RPM

DIGIT 13 - FILTER

B = Cleanable Wire Mesh

F = No Filters (T/A Rack)

C = High-Efficiency Throwaway

D = 90-95% Bag With Prefilters

G = No Filters (Bag/Cart. Rack)

DIGIT 14 - SUPPLY AIR FAN HP

DIGIT 15 - SUPPLY AIR FAN DRIVE

SELECTIONS

E = 90-95% Cartridge With Prefilters

A = Throwaway

1 - 3 HP

2 = 5 HP

3 = 71/2 HP

4 = 10 HP

5 = 15 HP

5 - 500 RPM

6 = 600 RPM

7 - 700 RPM

8 - 800 RPM

9 - 900 RPM

C 0 В 3 4 567 8 9 10 11 12 13 14 15 16 17 18 19 20 21

7 = 100%, 15 HP

8 = 100%, 20 HP

B = 50%, 3 HP

C = 50%, 5 HP

8 - 800 RPM

9 = 900 RPM

A = 1000 RPM

B = 1100 RPM

6 = 20 HP

7 = 25 HP

8 = 30 HP

9 = 40 HP

A = 1000 RPM

B = 1100 RPM

C = 1200 RPM

D = 1300 RPM

E = 1400 RPM

F = 1500 RPM

DIGIT 1 - UNIT TYPE

S = Self-Contained (Packaged Rooftop)

DIGIT 2 — UNIT FUNCTION

- A = DX Cooling, No Heat
- E = DX Cooling, Electric Heat**
- F = DX Cooling, Natural Gas Heat
- L = DX Cooling, Hot Water Heat*
- S = DX Cooling, Steam Heat*
- X = DX Cooling, No Heat, Extended Casing *(See Note 2)
 - **(See Note 3)

DIGIT 3 - UNIT AIRFLOW

H = Single Zone

DIGIT 4 -- DEVELOPMENT SEQUENCE

C = Third

DIGITS 5,8,7 - NOMINAL CAPACITY

- C20 = 20 Tons C55 = 55 Tons
- C25 = 25 TonsC60 = 60 Tons
- C30 = 30 Tons C70 = 70 Tons
- C75 = 75 Tons C40 = 40 Tons
- C50 = 50 Tons

DIGIT 8 -- POWER SUPPLY (See Note 1)

- 1 = 460/60/3 PWS A = 380/50/3 PWS
- 2 = 575/60/3 PWS B = 415/50/3 PWS
- 3 = 230/60/3 PWS C = 380/50/3 XL
- 4 = 460/60/3 XLD = 415/50/3 XL5 = 575/60/3 XIF = 200/60/3 XL
- 6 = 200/60/3 PWSF = 230/60/3 XL

DIGIT 9 — HEATING CAPACITY

- H = High Heat
- L = Low Heat 0 = No Heat
- Note: When the second digit is "E" for " electric heat, the following values
 - apply in the ninth digit:...

 - D = 30 KW R = 130 KW H = 50 KW U = 150 KW L = 70 KW V = 170 KW N = 90 KW W = 190 KW
 - Q = 110 KW

DIGIT 10 - DESIGN SEQUENCE

- A = First (Factory Assigned)
- B = Second. etc.

- 1. 20 through 60-ton units available in XL only.
- 2. When the second digit calls for "L" or "S", one of the following valve size values must be in digit 21 (Misc.): ... 1 = ½" 2 = ¾" 3 = 1" 4 = 1¾" 5 = 1½" 6 = 2"
- SEHC units (units with electric heat) utilizing 208V or 230V require dual power source.

EXAMPLE:

Model numbers: SFHCC254HC00B39A1A10L describes a unit with the following characteristics: DX cooling with natural gas heating, 25 ton: nominal cooling capacity, 460/60/3 power supply, high heat model. No exhaust or drive selection, cleanable wire mesh filters, 7½ hp supply an motor, supply fan drive selection No. 9 — (900 RPM), no fresh air, constant volume control, no accessory panel, 0 F ambient control, no agency approval and high-efficiency motors.

DIGIT 16 - FRESH AIR SELECTION

- A = No Fresh Air
- B = 0-25% Manual
- D = 0-100% Economizer

DIGIT 17 - SYSTEM CONTROL

- 1 = Constant Volume Electronic -
- Room Thermostat
- 3 = Variable Air Volume Electronic Supply Air With FROSTAT

DIGIT 18 - ACCESSORY PANEL

- A = None
- B = Signal Light Connection For Field
- Supplied Panel C = Remote Panel
- D = Remote Panel With Night Setback

DIGIT 19 - AMBIENT CONTROL

0 = Standard 1 = 0F

DIGIT 20 — AGENCY APPROVAL 0 = None 1 = UL 2 = CSA

(Only One Agency Approval Can Be > Ordered)

DIGIT 21 - MISCELLANEOUS (See Note 2)

- A Unit Disconnect Switch B = Hot Gas Bypass
- - Ultra Low Leak Fresh Air Dampers = High Duct Temperature Thermostat
- G = High Capacity Option (N/A on 70 Ton) -
- H = Copper Condenser Fins
- J = Remote Setpoint (VAV only)
- K = Zone Reset (VAV only)
- L = High-Efficiency Motors
- M = Fast Warm-Up Thermostat (VAV Only)
- N = Inlet Vanes Supply Fan With -
- Controls
- Extended Grease Lines T = Access Doors
- X = Compressor Lockout Thermostat ::
- (Economizer Only)
- = ICS Control Option-Tracer Integration
- Module (TIM)
- 8 = Two-Inch Spring Isolators



General Data

Table 8-1 — General Data — 20-40 Ton

C	20 Ton		25 Ton		30 Ton	40	Ton	
Compressor Data	244			-				
Number/Size (Nominal) Model	2/10 Ton	1/1	0 Ton. 1/15 Ton		2/15 Ton		Ton	
	Scroll		Scrott		Scroll		roll	
Unit Capacity Steps (%)	100/50 3450		100/40		100/50		5/50/25	
Evaporator Fans	3450	·	3450		3450	3450		
Number/Size/Type	2/15"/FC		2/15"/FC		0.404.50			
Hp Range	3-10		3-15		2/18"/FC		r/FC	
Cfm Range ¹	4000-9000		5000-11000		5-20		k-25	
TSP Range (In. WG)	0.25-4.0		0.25-4.0	•	000-13500		18000	
Exhaust Fans		00% 50%		V 500	0.25-4.0		5-4.0	
Number/Size/Type		5"/FC 1/15"/			100%	50%	100%	
Hp Range		.5-3 1.5-3				1/18"/FC	2/1 8"/FC	
Cfm Range		.5-3 -10000 2000-8			3-7.5	5-7.5	5-10	
ESP Range — (In. WG)		2-2.0 2.25-1					6000-1600	
Condenser Fans	0.25-1.4 0.	2-2.U 0.25-1	.4 0.2-2	. 0 0.25-1.4	0.2-2.0	0.25-1.4	0.2-2.0	
Number/Size/Type	20000		20040				_	
	2/26"/Prop.		3/26"/Prop.	;	3/26"/Prop.		/Prop.	
Hp (Each)	1.0		1.0		1.0		.0	
Cfm Combo@base	13600		18300		20900		200	
Cycle/Phase	60/3		60/3		60/3	60	0/3	
Evaporator Coil — Standard								
Size (Ft²)	16.3		20.3		24.4		2.8	
Rows/Fin Series	2/144		2/144		2/144		144	
Tube Diameter/Surface	1/2/Enhanced		1/2/Enhanced		/Enhanced	1/2/Ent	anced	
vaporator Coil — High Capacity								
Size (Ft²)	16.3		20.3		24.4		2.5	
Rows/Fin Series	4/144		4/144		4/144		144 -	
Tube Diameter/Surface	1/2/Enhanced		½/Enhanced		/Enhanced	½/Enh	anced	
Condenser Coil (Aluminum Fins) Size (Ft²)								
	35.0		35.0		46.3		3.2	
Rows/Fin Series/Tube Diameter Copper Condenser Fins (Optional)	3/156/ %		3/156/ %		3/168/ %		8/ %	
Electric Heat	3/144/%		3/144/ 1/6		3/156/ 1/4	3/15	6/ %	
KW Range ²	30-110		30-130		30-150			
Capacity Steps: CV/VAV							170	
Vatural Gas Heat	3/1		3/1		3/1	3	7	
Low Heat Input	235		235		350			
High Heat Input	500 -		235 · 500		350 500		50 <i>-</i> :	
Capacity Steps: CV/VAV	2/1		2/1		2/1		50	
fot Water Coil			2/1			2/	7	
Size (Inches)	30 × 86 × 2 Roy	20		20.	. ee a D			
Type			×66 × 2 Row		66×2 Row	_42×66		
	Type W, Prima I	но кур	e W, Prima Flo	тура	W, Prima Flo	Type W, I		
High Heat (Fins/Ft)	110		110		110	11		
Low Heat (Fins/Ft)	80		80		80	8	0	
Size (Inches)	30 x 66 x 1 Rov	v~ 30	×66×1 Row	- 30:	66×1 Row -	30×66×		
-							<1 Row -	
Type -	Type NS		Type NS		Type NS	Type		
High Heet (Fins/Ft)	96 ~		96		96 **		6	
Low Heat (Fins/Ft)	42		42		42	4	2	
ilters								
Panel Filters								
Number/Size (Inches)	12 — 20×20×	2 12	- 20×20×2	16 -	-20×20×2	16 20		
Face Area (Ft²)	33.3		33.3 🛶		44.4 ==	55	.5 ⇔	
Bag Filters		_		_				
Number/Size (Inches)	4 — 12×24×1		- 12×24×19		12×24×19	5 — 12 ×		
	3 - 24×24×1		- 24×24×19		24×24×19	6 24 ×		
Cartridge Filters	4 12 × 24 × 1		- 12×24×12		12×24×12		(24×12	
	3 24×24×1		- 24×24×12		24×24×12	6 — 24 ×		
Prefilters (For Bag & Cartridge) 77	4 — 12×24×2		-12×24×2		12×24×2	5 — 12 ×	(24×2	
	3 — 24×24×2	3-	– 24×24×2	6	-24×24×2	6-24×	(24×2	
Face Area (Ft²)	20.0		20.0		28.0	34	.0	
Standard Unit Minimum Outside A		echanical Cooling						
Without Hot Gas Option	55 F	•	50 F		50 F=~	55	F	
With Hot Gas Option	55 F		50 F		50 F	55	F	
ow Ambient Option Minimum Ou								
.cow Ambient Option Minimum Ou Without Hot Gas Option With Hot Gas Option		1+	0 F === 10 F		0 F ~ 10 F	0	F "	

General Dàta

	90	Ton	105	Ton	116	Ton	120	Ton
Compressor Data		·······				ion	130	ion
Number/Size (Nominal)	2/40	Tion	1/40 Ton	1/50 Ton	251	Ton	200	Tion
Model	Mod	del R	Mor	tel R		deiR		del R
Unit Capacity Steps (%)	100/75	5/50/25	100/7	V44/22		5/50/25		5/50/25
RPM	17	50	17	50		750		5/5U/25 750
Evaporator Fans						750	1	/50
Number/Size/Type	2/27	"FC	2/27	"/FC	2/27	TT/FC	201	7"/FC
Hp Range	30-	-80	30	-80		-80 -80		7 /PC 1-80
Cfm Range ¹	27,000-	-45,000	31,000	-46.000		-46,000		-46.000
TSP Range — (in. WG)	1.0-	4.75	1.0-	4.70		4.70		-4.70
Exhaust Fans	50%	100%	50%	100%	50%			
Number/Size/Type	1/22"/FC	2/22"/FC	1/22"/FC	2/22"/FC		100%	50%	100%
Hp Range	15	15-40	15	15-40	1/22"/FC	2/22"/FC	1/22"/FC	2/22"/FC
Cfm Range				24.000-40.000	15	15-40	15	15-40-
ESP Range — (In. WG)	.25-2.5	.25-2.5			. 0,000 20.000	24,000-40,000	, 20,000	24,000-40,000
Condenser Fens	.25-25	.43-4.3	.25-2.5	.25-2.5	.25-2.5	.25-2.5	.25-2.5	25-2.5
Number/Size/Type		•		_				
	8/26"/			Prop.	10/26	"/Prop.	12/26	"/Prop.
Hp (Each) Cfm	1.			.0		.0	1	.0
	59,2			200	70,	222	84,	267
Cycle/Phase	60	<i>V</i> 3	60	1/3	60	V3	60	0/3
Evaporator Coil — Standard								
Dimensions	122.0			c 71 <i>.</i> 25	122.0	x 71.25	122.0	x 71.25
Size (Ft²)		.3 .			60.4		60	0.4
Rowa/Fin Series	3/1		4/1	20	5/1	44	5/1	44 .
Tube Diameter/Surface	½/Enh	enced	½/Enh	anced	1/4/Enh	anced	1/s/Enh	anced
Evaporator Coil — High Capacity								
Dimensions	122.0		122.0 :	t 71 <i>.2</i> 5	N	A 🖘	N	A → : -
Size (Ft²)	59		60	4	N	A	N	A ==
Hi-Capacity Rows/Fin Series	5/1-		5/1	44	N	A	N	A
Tube Diameter/Surface	1/4/Enh	anced	1/2/Enh	anced	N.	/A	N	A
Condenser Coil								
Size (Ft²)		2:		2 -	15	52 T	15	52 📆
Rows/Fin Series/Tube Dierneter	3/156	S/ %	4/15	S/ %	4/15	6/ %	4/15	6/ 1/4
Electric Heet								
KW ·	19	0 🛰	19	0 🐠	19	10	19	00 8 2
Capacity Steps: CV/VAV	3/	1 •	3/	1	3/	7	3/	M =
Natural Gas Heat								·
MBh Input		00'≪	10	DD 28≈	10	00 🜤	10	00:≰
Capacity Steps: CV/VAV	2/	1 .*	2/	1	2/	1	2/	1
filters		•						
Panel Filters								
Number/Size (Inches)	25-24x	242	25-240	24x2	25-24	(24)(2	25-245	242
Face Area (Ft²)	100).0	100	1.0	100).0		0.0
Bag Filters	3-1200	24x19	3-12x	24x19	3-12x	24×19		24x19
Number/Size (Inches)	15-24	24x19	15-24x	24x19	15-24x	24x19		24x19
Cartridge Filters	3-12-0	24x12	3-12x	24x12	3-12x	24x12		24x12
	15-240	24x12	15-24x	24x12	15-24x	24x12		24x12 -
Prefilers (For Bag & Cartridge)	3-200		3-20x			2Ax2		260
	15-240	245/2	15-24x		15-24x	24x2		242
Face Aree (Ft ²)	66.			0		.0		.0 5/2

Table 10-2 --- ARI Performance Data¹

	ARI Performance Data ¹					_
Tons ~	Model ²	Capacity (MBh)	EER	٠,-	IPLV ²	-
	SAHCC2040Y**A**A****	218 🚁	9.0	.	11.8	7
	SXHCC2040Y**A**A*****	218 😤	9.0	*	11.8	4:
	SFHCC204LY**A**A****	218 🔫	8.9	æ	11.7	٠.
20 -	SEHCC204*Y**A**A****	218 ≰	8.9	*	11.7	
	SUHCC204LY**A**A****	216 =	8.9	نې	11.6	*
	SSHCC204LY**A**A*****	218 -			11.7	

52 : 1

Table-40-3 — ARI Correction Multipliers

				4.7
Model	-EA	Mu	Itipliers (%)
Digit	Designato	r Capacity	EER	IPLY WE
8	· E	100 🚓	100 #	100
8	· F	101	99 🕶	99
	PS H	100 æ 100 æ 100 æ	100 -45- 99 197 99 197	98
		100 .≇ 99 .≇ 99 .⇒	101 · ► 95 😎	101. 91 92
16	D	100	99 🔻	98 🗫
21 **	- G	113	109 😑	107
21_	L	100	101	101
21	N	100	99	99
	Digit 8 8 9 9 9 13 13 13 16 21 21	8 E 8 F 9 H = 9 H = 13 D 13 E 16 D 21 G	Digit Designator Capacity	Digit Designator Capacity EER

Economizer Outdoor Air Damper Leakage (Of Rated Airflow)

	ΔP Across Der	moers (In. WC)
	0.5 (ln.)	1.0 (ln.)
Standard "Low Leak"	1.5 %	2.5 %
Optional "Ultra Low Leak"	0.5 %	1.0 %

Performance Data

Table 40-1 — Supply Fan Performance WITHOUT INLET VANES — 40, 50 and 55 Ton "C" Style

Cfm								Total Stati	c Pressun							
Std	.25	50	.50	00	.73	50	1.0	000	1.2	250	1.5	500	1.7	50	2.0	000
Air	Rom	Bhp	Rom	8hp	_Rom	8ho	Rom	Bho	Rom	Bho	Rom	Bho	Rom	Bho	Rom	Bhp
8000	290	.66	396	1.27	479	1.95	550	2.57	613	3.44	671	4.23	723	5.05	770	5.90
9000	298	.77	400	1.44	482	2.16	553	2.93	616	3.75	673	4.61	725	5.49	774	6.39
10000	311	.94	404	1.61	486	2.38	556	3.20	618	4.07	675	4.99	727	5.93	776	6.89
11000	329	1.16	409	1.79	490	2.63	559	3.50	621	4.41	677	5.37	729	6.37	778	7.40
12000	349	1.43	414	2.00	494	2.89	563	3.81	624	4.77	680	5.78	731	6.82	780	7.90
13000	370	1.75	424	2.26	499	3.16	567	4.15	628	5.16	683	6.21	734	7.30	782	8.43
14000	391	2.12	438	2.60	504	3.44	571	4.49	632	5.57	687	6.67	737	7.80	785	8.97
15000	413	2.54	455	3.01	510	3.77	576	4.86	636	5.99	690	7.15	741	8.33	789	9.55
16000	435	3.02	474	3.50	520	4.18	581	5.24	640	6.43	695	7.65	745	8.89	792	10.16
17000	457	3.54	494	4.06	534	4.68	586	5.65	645	6.89	699	8.17	749	9.47	796	10.79
18000	479	4.13	515	4.68	550	5.29	595	6.15	650	7.37	703	8.71	753	10.07	800	11.46
19000	501	4.78	536	5.38	569	5.98	607	6.76	656	7.89	708	9.27	758	10.70	804	12.14
20000	524	5.49	558	6.15	588	6.75	622	7.49	664	8.50	713	9.85	762	11.34	809	12.84
21000	546	6.28	580	7.00	608	7.61	639	8.32	676	9.25	719	10.49	767	12.00	813	13.57
22000	569	7.14	602	7.92	629	8.55	658	9.26	690	10.12	728	11.25	773	12.70	818	14.32
22500	580	7.60	613	8.40	640	9.05	667	9.76	698	10.60	734	11.68	776	13.07	820	14.32
23000	591	8.08	624	8.90	651	9.58	677	10.29	706	11.11	740	12.15	780	13.48	823	
24000	614	9.10	646	9.97	672	10.70	697	11.41	724	12.22	754	13.19	789	14.41	829	15.09 <u>1</u> 5.93

Cfm								otal Stati	c Pressure	3						
Std	2.2	50	2.5	00	2.7	750	3.0	00	3.2	250	3.5	500	3.7	50	4.0	000
<u>Air</u>	Rpm	Bhp	Rom	Bho	Rpm	Bho	Rpm	Bhp	Rpm	Bhp	Rom	Bhp	Rom	Bhp	Rom	Bhp
8000	814	6.80	854 -	7.73	892	8.69	927	9.67	961	10.66	993	11.67	1023	12.69	1053	13.71
9000	819	7.32	861	8.28	901	9.27	938	10.31	972	11.37	1006	12.45	1037	13.55	1068	14.67
10000	822	7.88	865	8.89	906	9.92	944	10.98	980	12.07	1015	13.20	1048	14.35	1079	15.53
11000	824	8.45	867	9.52	908	10.61	948	11.72	985	12.85	1021	14.00	1055	15.18	1087	16.40
12000	826	9.01	869	10.15	910	11.30	950	12.47	988	13.66	1024	14.87	1059	16.09	1092	17.34
13000	828	9.59	871	10.78	912	11.99	952	13.23	989	14.48	1026	15.75	1061	17.04	1095	18.34
14000	830	10.18	873	11.42	914	12.69	954	13.98	991	15.30	1028	16.63	1063	17.98	1097	19.35
15000	833	10.80	876	12.09	917	13.40	956	14.75	994 -	16.12	1030	17.51	1065	18.92	1099	20.35
16000	837	11.48	879	12.78	920	14.14	958	15.54	996 -	16.96	1032	18.40	1067	19.87	1101	21.36
17000	840	12.14	882 -	13.52	923	14.92	961	16.36	999	17.82	1035	19.32	1069	20.83	1103	22.38
18000	844	12.88	886 -	14.28	926	15.73	964 ≖	17.21	1002	18.72	1037	20.26	1072	21.82	1106	23.41
19000	848	13.60	890	15.08	930	16.58	968 -	18.11	1005	19.66	1040	21.24	1075	22.85	1108	24.48
20000	852	14.36	894 -	15.90	934	17.46	972	19.04	1008	20.64	1044	22.27	1078	23.92	1111	25.60
21000	857	15.15	898	16.75	938	18.37	976	20.00	1012	21.66	1047	23.33	1081	25.03	1114	26.75
22000	861	15.96	902	17.63	942	19.30	980	20.99	1016	22.70	1051	24.43	1085	26.18	1118	27.95
22500	864	16.38	905	18.07	944	19.78	982 -	21,50	1018	23.24	1053	25.00	1087	26.77	1120	28.57
23000	866	16.80	907	18.52	946	20.26	984 -	- 22.01	1020	23.78	1055	25.57	1089	27.37	1122	29.19
24000	871	17.66	912	19.45	951	21.25	988	23.06	1024	24.89	1059	26.73	1093	28.59	1125	30.47

Cfm				Total Static	Pressure -			
Std ·	4.25	50 ^	4.50	10 ¤	4.75	501≘	5.0	00 ⁻² .
Air	RPM:	BHP *	RPM	BHP -	RPM	BHP ·	RPM	BHP
8000	1081	14.75	1108	15.78	1134	16.83	1160 :	17.88
9000	1097	15.80 4	1125 表	16.94 -	1152	18.08 *		
10000	1109	16.73	1138 🗈	17.95	1168 -	19.18 :		
11000	1118 5	17.84 25	1148 *	18.91				
12000	1124	18.61	1155 *	19.91				
13000	1128	19.65-4	1159 ~	20.99				
14000	1130	20.73 ::	1162 22	22.12				
15000	1132	21.80 *	1164 ≇:	23.26				
16000	1134 ~	22.86 🌤	1166 *	24.39				
17000	1136	23.94 -	1168 🐄	25.52				
18000	1138 -	25.03 🖫	1170 ≥	26.66				
19000	1141	26.15						
20000	1144 🖘	27.30 ×						
21000	1147	28.50						
22000	1150	29.74						
22500	1152 ~	30.36 -						
23000	1153 🛎	31.03 -4						
24000	1157 *	32.36						

- Notes:

 1. Fan performance for 40, 50, and 55 ton "C" style rooftops is identical. However, note maximum motor hp size for each size. Contact your local Trans representative for information on oversized motors.

 2. Shaded areas at table extremes note non-standard Bhp or Rpm selection. Contact your local Trans representative for
- 2. Shaded areas at table extremes note non-scanceru any or reminentation.

 3. Supply fan performance table includes internel resistance of rooftop. For total static pressure determination, system externel static must be added to appropriate component static pressure drops levaporator coli, filters, optional excending only extended classing, optional economicer, optional exhaust fan, optional heating system, optional coling only extended classing, optional roof curbl.

 4. Maximum Cfm for UL approvals as follows: 40 Ton 18,000 Cfm

 50 Ton 22,500 Cfm

 55 Ton 24,000 Cfm

 7.5 No.

 7. Maximum

 7. M

- 5. Minimum motor horsepower is 7.5 hp.
 6. Maximum motor horsepower as follows: 40 Ton 25 hp.
 50 Ton 30 hp.
 55 Ton 30 hp.

- Mid-table shading indicates maximum motor horsepower divisions.

 7. Maximum 7.5 hp through 15 hp motor Rpm is 1,141 Rpm.

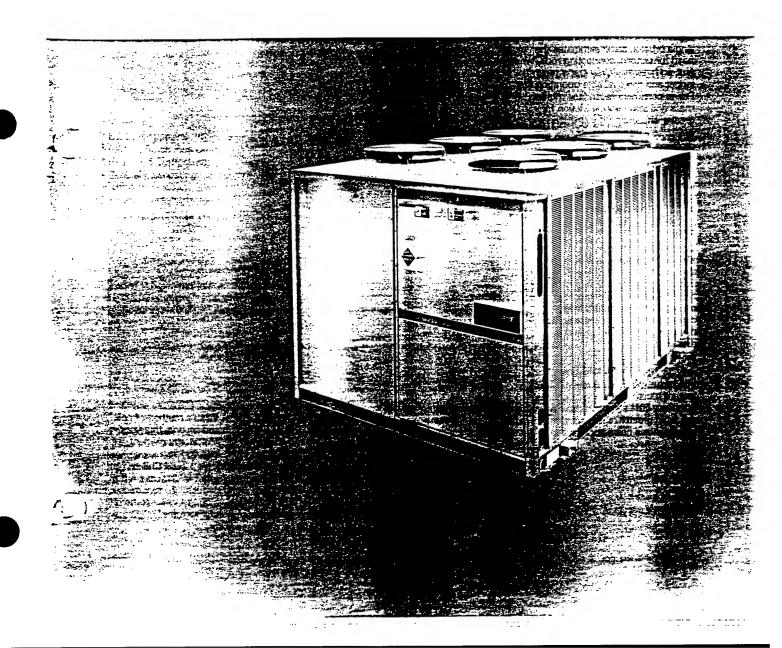
 8. See RT-EB-81 for further details.



25 OF 41 ECO B-8 S/S-DS-1 September 1991 First Printing

Split System Condensing Units And Remote Chillers 20 through 120 Tons

70 TON LMITS FLOGS 205, 207, 200, 230, 229 20 00 000 300 300 300 40 TN ONT BLOG 81 10 -10 UNIT 6006 81





26 OF 41 ECO B-8

-BLDG 205 208 207 236 229

T \$106 81

General

Data

Table 6-1 — General Data — 20-120 Ton Condensing Units

P 8106 81

RADIE OF 1 — General Data	- 20-120 1	on Congen	sing Units	4		₩	•		1
Nominal Tonnage Model Number	20 RAUC-C20	25 RAUC-C25	30 RAUC-C30	40 RAUC-C40	50 RAUC-C50	60 RAUC-C60	80 RAUC-C80	100 RAUC-D10	120 RAUC-D12
Compressor Data									12 100 012
Туре	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll ·	Model R	Model R	Model R
Manifolded Sets							Semi-Hermetic	Semi-Hermetic	Semi-Hermetic
Circuit #1	10T + 10T	10T + 15T	15T + 15T	10T + 10T	10T + 15T	15T + 15T	40T :	50T	60T ·-
Circuit #2	NA	N/A	N/A ≭	10T + 10T	10T + 15T	15T + 15T	40T	50T	60T : .
Unit Capacity Steps (%)	100-50	100-40	100-50	100-75-50-25	100-80-60-30	100-75-50-25			
No Control & VAV Option							100-75-50-25	100-67-50-33	100-67-50-33
EVP Option							100-75-50-25	100-83-67- 50-33-16	100 -83-67- 50 -33-16
Condenser Fan Data									33 60 10
Quantity/Fan Dia./Type	2/26"/Prop.	3/26"/Prop.	3/26"/Prop.	4/26"/Prop.	6/26"/Prop.	6/26"/Prop.	8/26"/Prop.	12/26"/Prop.	12/26"/Prop.
Fan Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
No. of Motors/Hp Each	2/1.0	3/1.0	3/1.0	4/1.0	6/1.0	6/1.0	8/1.0	12/1.0	12/1.0
Nominal Total Cfm	14000	18300	20900	28200	35600	40800	49600	66800	76000
Condenser Coil Data									
Number of Coils/Size (Inches)	1/63x71	1/71x 71	1/45x71 1/49x71	2/65x 70	2/51 x96	2/66x 96	4/65x70	4/51 x96	4/66x :96
Face Area (Sq. Ft.)	31.0	35.0	46.1	63.2	67.1	88.0-	126.4	134.2	176.0
Rows/Fins Per Ft.	3/168	3/156	3/168 -	3/168	3/156	3/168	3/168	3/156	3/168
Condenser Storage Capacity (Lbs) (2)	67	76	96 🕶	136 ≤	142	184 🌤	272	284	368 Æ
Refrigerant Data									
No. Refrigerant Circuits	1	1	1	2	2	2	2	2	2
Refrigerant Type	R-22	R-22	R-22 ~	R-22	R-22	R-22	R-22	R-22	R-22 ::
Refrigerant Operating Charge (Lbs) (1)	28 🖘	31 -	40 ☀	58 🖚	62 ≇	80 =	116	124	160 -€
Minimum Outdoor Air Temper	sture For Me	chenical Co	oling						
Standard Ambient Operating Range (F)	40-115	40-115	40-115	40-115	40-115	40-115	40-115	40-115	40-115
Low Ambient Option (F)	0	0	0	0	0	0 .	0 .	0	0

Operating charge is approximate for condensing unit only, and does not include charge for low eide or interconnecting lines.
 Condenser storage capacity is given at conditions of 95 F outdoor temperature, and 95% full.

Table 6-2 — Evaporator Chillers — 20-120 Tons

	-				~~	,										
Nominal Tonnage	20		25		30	,	40	50	60		80		100	_	120	- .
No. Of Circuits	1		1		1		2	2	2		2		2		2	
Volume Shell (Gal) (1)	11.7	,	10.7		16.3		13.8	21.0	18.5	a	43.1	_	35.0		47.9	-
Tube Pull (In.) (2)	73	-	73		74		74	96								
Refrigerant Operating Charge ~ (Lbs) (3)	8	700	10	Ľ												

Votes

1. Shall volume is for waterside only.

2. Tube pull given is length of the eveporator.

Operating charge is approximate and for the evaporator chiller only.

Table 6-3 — EER Data — Condensing Unit Only (1)

Nominal	Model:	Net *** Capacity	Total Unit Compressor	Condenser Fan - KW -	Control	Condensi	ng Unit - : . '-
Tonnage	Number	(MBH)	KW =	Each/Total	KW **	Total KW	EER ≈
20	RAUC-C20	239 🌤	20.1~	0.9/1.8	0.25	22.2	10.8
25	RAUC-C25	312 -	26.0 ≄≭	0.9/2.7	0.25 🤝	29.0 🕾	10.8 🖜
30	RAUC-C30	374	31.2	0.9/2.7	0.25	34.2 -	10.9 👄
40	RAUC-C40	506 ∞≠	40.2 **	0.9/3.6	0.40 🌣	44.2 :	11.4 %
50	RAUC-C50	621 ^	52.4 -	0.9/5.4	0.40 -	58.2	10.7 =
60	RAUC-C60	744 -	62.8 "	0.9/5.4	0.40 ≈	68.6 ~	10.8 🌫
80	RAUC-C80	1049 😴	91.6 -	0.9/7.2	0.50 =:	99.3 :	10.8
100	RAUC-D10	1337	109.0=	0.9/10.8	0.50	120.3 -	11.1
120 😙	RAUC-D12	1633	133.8 🛣	0.9/10.8	0.50	145 9:	11 2 7:

1. Condensing unit only ratings are per API 305. Pull load relings are at 95 F entering air temperature, and relingerant conditions entering the condensing unit of 45 F seturated and 60 F actual temperature. Part load ratings are at 80 F entering air temperature and relingerant conditions entering the condensing unit of 50 F seturated suction and 65 F actual temperature. For use of 200/230 vots unit in 230 vot applications: increase capacity rating by 1%, increase power by 1.5% and decrease efficiency by 1%. All capacity, two and EER figures are at conditions of 45 F-seturated suction temperatures at the compressor and 95 F arbitions.

12 8

Performance Data

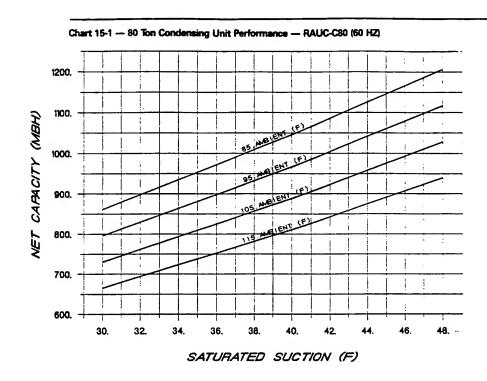
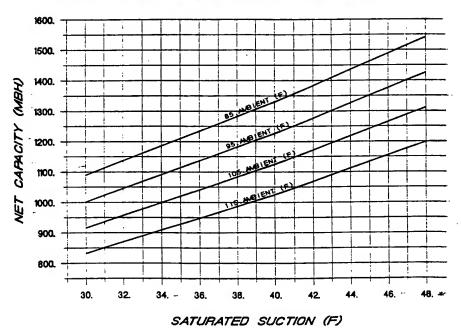


Chart 15-2 — 100 Ton Condensing Unit Performance — RAUC-D10 (60 HZ)



JE]



Electrical Data

Table 19-1 — Condensing Units

				Unit Charac	tenstics		
Nominal Tons	Model Number	Voltage/Start Characteristics	Allowable Voltage Utilization Range	Minimum Circuit Ampacity (3), (6)	Maximum Fuse Size (4), (6)	Recommended Dual Element Fuse Size (5), (6)	Number Of Compressors
	RAUC-C20G	200-230/60/3XL	180-220/208-254	101	125	125	2
20	RAUC-C204	460/60/3XL	416-508	44	60	50	2
	RAUC-C205	575/60/3XL	520-635	35	45	40	5
	RAUC-C25G	200-230/60/3XL	180-220/208-254	129	175	150	2
25	RAUC-C254	460/60/3XL	416-508	56	80	70	5
	RAUC-C255	575/60/3XL	520-635	45	60	60	2
	RAUC-C30G	200-230/60/3XL	180-220/208-254	148	200	175	2
30	RAUC-C304	460/60/3XL	416-508	65	90	80	2
	RAUC-C305	575/60/3XL	520-635	52	70	60	2
	RAUC-C40G	200-230/60/3XL	180-220/208-254	192	225	225	
40	RAUC-C404	460/60/3XL	416-508	84 -	100	90	4
	RAUC-C405	575/60/3XL	520-635	67	80	50 80	4
	RAUC-C50G	200-230/60/3XL	180-220/208-254	244	300	300	
50	RAUC-C504	460/60/3XL	416-508	106	125	125	4
	RAUC-C505	575/60/3XL	520-635	85	100	90	4
	RAUC-C60G	200-230/60/3XL	180-220/208-254	282	300	300	
60	RAUC-C604	460/60/3XL	416-508	123	125	125	4
	RAUC-C605	575/60/3XL	520-635	98	110	110	7
	RAUC-C802	575/60/3PW	520-635	137	175	175	
	RAUC-C803	230/80/3PW	208-254	343	450	400	5
80	RAUC-C804	460/80/3XL	416-508	171	225	200	5
	RAUC-C805	57 5/60/3XL	520-636	137	175	175	5
	RAUC-C806	200/80/3PW	180-220	394	500	450	2
	RAUC-D102	575/60/3PW	520-636	155	200	175	2
	RAUC-D103	230/80/3PW	208-264	390 🛧	500	450	ž
100	RAUC-D104	460/60/3XL	416-508	195 :-	250	225	2
	RAUC-D105	575/60/3XL	520-635	155	200 ~	175	ž
	RAUC-D106	200/80/3PW	180-220	448	600	500	2
	RAUC-D122	575/60/3PW	520 -63 5	191	250	225	2
120	RAUC-D123	230/60/3PW	208-254	480 -≖	600	600	2
120	RAUC-D124 RAUC-D125	460/ 60/3 XL	416-508	240	300 🖈	300	2
	RAUC-D125	575/60/3XL	520-635	191 =	250 ₹	225 ~	2
	TAUC-D126	200/60/3PW	180-220	551	700	700	2

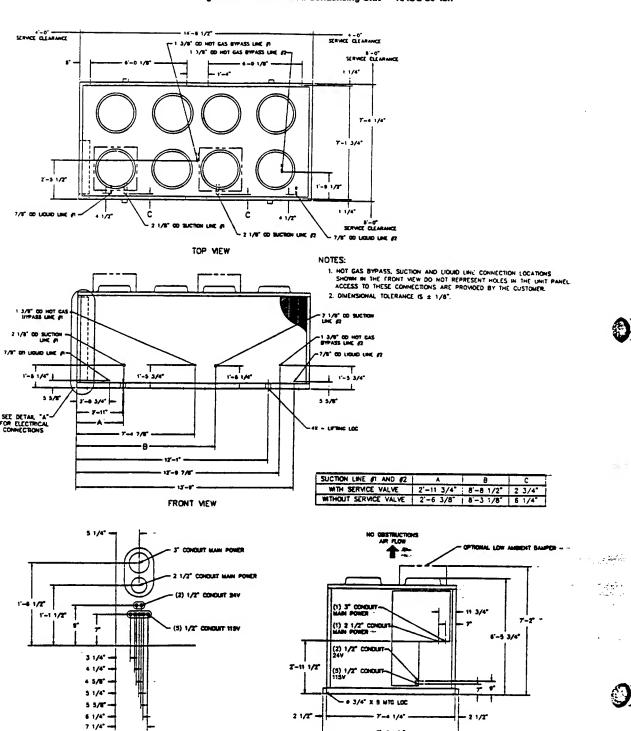
Table 19-2 — Compressor Motor And Condenser Fan Data

ominal			Compres	sor A (7)	Compre	ssor 8	Compre	secr C	Compre	esor D	Condense	r Face
Tons	Model	Voltage	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	Qtv.	FLA
		200/230 XL	41.4	247	41.4	247					2	41
20	RAUC C20	460	18.1	95	18.1	95	_	_		_	5	1.8
		575	14.4	76	14.4	76 -			_	_	2	1.4
		200/230 XL	60.5	376	41.4	247					3	4.1
25	RAUC C25	460	26.3 -	142 -	18.1 -	95		_	_	_	3	1.8
		575	21.0	114	14.4	76	_	_	_	Ξ	3	1.4
		200/230 XL	60.5	376	60.5	376					3	
30 -	RAUC C30	460	26.3	142 =	26.3	142 =		_ :	_	_	3	1.8
		575	21.0	114	21.0	114 -			_	_	3	1.4
		200/230 XL	41.4	247_#_	41.4	247	41.4	247 🔟	41.4	247	4	41
40 ≈	RAUC C40	460	18.1 ~	95 🕶	18.1	95 *	18.1	95 4	18.1	95	4	1.8
		575	14.4	76 .≻	14.4	76	144	78 -	14.4	78	Ā	1.4
		200/230 XL	60.5	376 -#	41.4 :	247 .5:	60.5	376 🖛	41.4 · ·	247	6	412
50 ≉	RAUC C50		26.3	142 😅	18.1 =	95 🕶	26.3	142 =	18.1	95	Ř.	1.8
		575	21.0	114 -	14.4	76	21.0	114	14.4	76	6	1.4
		200/230 XL	60.5	376 ==	60.5	376	60.5	378 -	60.5 -	376 -	6 ·	41 =
ھـ 60	RAUC C80		26.3	142 🚓	26.3	142 🖛	26.3 %	142 =	26.3	142 ***	6	1.8
		575	21.0	114	21.0	114	21.0 -	114 -	21.0	114	6	1.4
			(1)	(2)								
		200 PWS	160.3	430/729 "	_						8 10.	417
		230 PWS	139.4	375/631	_					_	8 -	3.6
80	RAUC C80		69.7 :	315	_			- -		_	8	1.8
		575 PWS	55.8	150/246	_	_			-		8 -	14
		575 XL	55.8 -=-				-		-	-	8	1.4
		200 PWS	177.1	550/910	-	_			_		12	41
		230 PWS	154.0	480/792	-	_	_		_	_	12 -	4.1
100 :	RAUC D10		77.0	396 ↔		— "	_				12 😁	1.8
		575 PWS	61.6	190/315	_					- ·	12 ~	1.4
		575 XL	61.6 -	315 -							12 😤	1.4
		200 PWS 230 PWS	223.1	620/990	-	-	_		_	_	12 .	4.1
120 **	RAUC D12		194.0 - 97.0	535/880 430	_ ~		_	- ··	-		12	3.6.4
120 -		575 PWS	77.6	220/346		-	_	- ·	-	_	12 😁	1.8
		575 XL	77.6	346 ₺				_	_	_	12 12	1.4

Dimensional Data

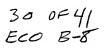


Figure 26-1 — Air-Cooled Condensing Unit — RAUC 80 Ton



SIDE VIEW

DETAIL "A" (PANEL ACCESS TO ELECTRICAL CONNECTIONS)

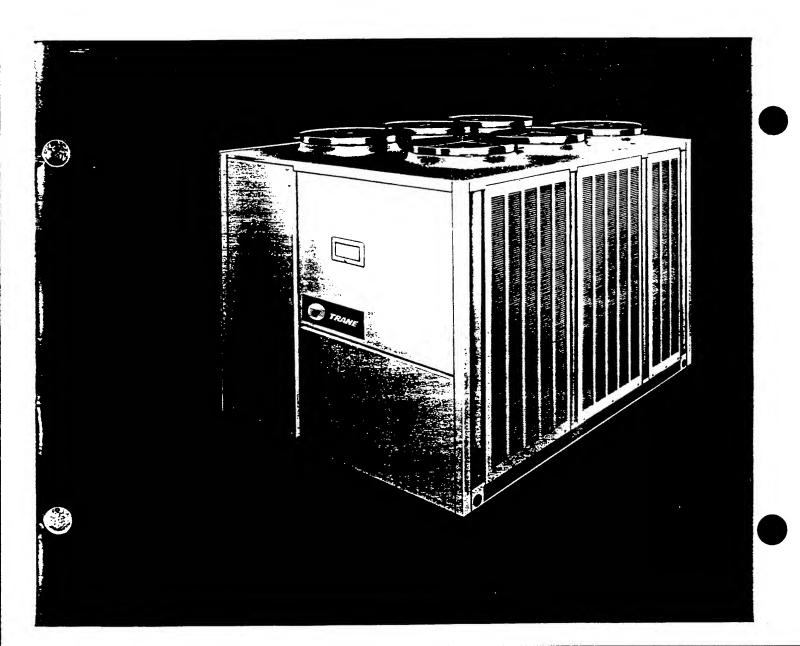




CG-DS-1 September 1992

Air-Cooled Liquid Chillers

10 through 120-Tons FLOS DI ZO TON UNIT





General **Data**

BL06 101 - BLDGS Z10, Z90

30

10

100-50

60.0

14.0

40 🚓

40

10

76.0

8.0/14.0

100-80-60-30 100-75-50-25

40 🖚

0 🕹

10 🛎

100.0

140 2

عظ در او جنا در اور

30

40

10 -

100-75-50-25

76.0 😁

8.0 ---

30 ==

40 ----

0 -

10 €

100-60-40

41.5

8.0/14.0

	10 Ton	15 Ton	20 Ton	25 Ton	30 Ton	40 Ton	50 Ton	60 Ton
Model Number	CGA120	CGA 180	CGAD-C20	CGAD-C25	CGAD-C30	CGAD-C40	CGAD-C50	CGAD-C60
Compressor Data								00/10/000
Model	Climatuff ⁷⁶	Trane H	Scrott	Scroll	Scrott	Scrott	Scroll	Scroll: -
Quantity	2	2	2	1/1	2	4	2/2	A
Nominal Tons Per Compressor	5	7.5	10	10/15	15	10	10/15	15 ⊶
Evaporator								
Nominal Size (Tons)	10	15	20	25	30	40 ~	50	60 ≉⊷
Water Storage Capacity (Gallons) (2)	1.4 -	1.5	11.7	10.7	16.3	13.8	21.0	18.6 ⋅
Min. Flow Rate (GPM)	12.0	18.0	24	30	36 -	48	60	72 3
Max. Flow Rate (GPM)	36.0	54.0	72	90	108	144	180	216
Max EWT At Start-Up — Deg F (3)	100 -	100	108	108	108	108	108	108
Condenser								100 /
Nominal Size (Tons)	10	15	20	25	30	40	50	60 ≠∹
Number of Coils	1	2	1	1	2	2	2	2
Coil Size (ea., Inches) ⁴	28 x 108	28 x 83	55 x 71	61 x 71	45 x 71/35 x 71	56 x 70	44 x 96	57 x 96
Number of Rows	2	2	3	3	3	3	3	3
Subcooler Size (ea., Inches)	4 x 108	4 x 83	8 x 71	10 x 71	14 x 71	9 x 70	7 x 96	9 x 96
Condensor Fans				-				<u> </u>
Quantity	1	2	2	3	3	4	6	6
Diameter (Inches)	28"~	26* -	26	26	26	26	26	26 -
CFM (Total)	8,120:	11,600	14,000	18,300	20,900	28,200	35,600	40. 800 : 4:
Nominal RPM	1100 %	1100	1140 -	1140	1140 -	1140	1140	1140
Tip Speed (Ft/Min)	8080	7490 ~	7750	7750	7750	7750	7750	7750 ∌
Motor HP (ea.)	1	1/2	1.0	1.0	1.0	1.0	1.0	1.0
Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct

30 🛩

40 =

10 🐾:

100-50

8.0

36.5 :-

Refrigerant Charge (lbs. R22/Circuit) 9.5 # Oil Charge (Pints/Circuit) 42 -*Unloading steps depend upon which compressor is leed compre

Minimum Outdoor Air Temperature Permissibl For Mechanical Cooling (1) Standard Ambient Control Unit (Deg. F)

Low Ambient Option (Deg. F)
Low Ambient Control With Hot Gas Bypass

Standard Ambient with Hot Gas Bypass

No. of Independent Refrigerant Circuits

Table 14-1 — General Data — 10-60 Ton Units

Tonceuring swips separate upon which comprise
Note: "

(1) Minimum start-up ambient based on unit at
(2) Includes piping internal to chille: "

(3) At 95 F ambient. "

(4) Dose not include subcooling portion of coil. ed on unit at minimum step of unloading and a 5 mph wind across the conder

50 *

60 ≯

0 *

15 🌤

100-60

45 -

60 -

15 🖘

100-50

12.4 -

Light of the

(Deg. F)

(Deg. F) General Unit **Unload Steps**



Performance Data

to-30 Tur Fuli Load

Table 26-1 — 10 Ton — CGA 120

					E	intering	Condenser A	ir Tempe	rature (C	Degrees F)					
		75		85				95			105			115	
LWT (Deg F)	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER
40	9.2	8.6	11.6	8.7	9.2	10.2	8.2	9.8	9.1	7.6	10.3	8.1	7.0	10.8	7.1
42	9.5	8.7	11.8	9.0	9.3	10.5	8.5	9.9	9.3	7.9	10.5	8.2	7.3	11.0	7.2
44	9.8	8.8	12.0	9.3	9.5	10.7	8.8	10.1	9.5	8.1	10.7	8.4	7.5	11.3	7.4
45	10.0	8.9	12.2	9.5	9.5	10.8	8.9	10.2	9.5	8.3	10.8	8.4	7.7	11.4	7.4
46	10.2	8.9	12.3	9.6	9.6	10.9	9.0	10.3	9.6	8.4	10.9	8.5	7.8	11.5	7.5
48	10.5	9.0	12.5	9.9	9.8	11.1	9.3	10.4	9.8	8.7	11.1	8.6	8.0	11.7	7.6
50	10.8	9.1	12.8	10.2	9.9	11.3	9.6	10.6	10.0	9.0	11.3	8.8	8.3		
55	11.6	9.4	13.3	11.0	10.2	11.8	10.4	11.0	10.4	9.7	11.8	9.1		11.9	7.7
60	12.4	9.7	13.9	11.8	10.6	12.2	11.3	11.4	10.7	10.4	12.3	9.4	9.0 9.7	12.5 13.1	8.0 8.2

Table 26-2 — 15 Ton — CGA 180

					E	ntering	Condenser A	ur Tempe	rature (C	Degrees F)					
	-	75		85			95			105			115		
LWT (Deg F)	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER
40	15.6	14.9	11.7	14.5	15.7	10.4	13.4	16.3	9.3	12.3	16.8	8.2	11.2	17.3	7.3
42	16.1	15.2	11.9	15.0	16.0	10.6	13.9	16.7	9.4	12.8	17.3	8.4	11.6	17.8	7.4
44	16.7	15.5	12.1	15.6	16.4	10.7	14.4	17.0	9.6	13.3	17.7	8.5	12.1	18.2	7.5
45	17.0	15.7	12.2	15.8	16.5	10.8	14.7	17.3	9.6	13.5	17.9	8.6	12.3	18.4	
46	17.2	15.8	12.3	16.1	16.7	10.9	14.9	17.5	9.7	13.8	18.1	8.6	12.6	18.7	7.6
48	17.8	16.1	12.4	16.6	17.0	11.0	15.5	17.8	9.8	14.3	18.5	8.7	13.0		7.7
50	18.4	16.4	12.6	17.2	17.4	11.2	16.0	18.2	9.9	14.8	18.9	8.9	13.5	19.1	7.8
55	19.8	17.2	13.0	18.6 -	18.2	11.6	17.3	19.2	10.3	16.0	20.0	9.1	14.7	19.6	7.9
60	21.3	18.0	13.4	20.0	19.1	11.9	18.6	20.1	. 10.6	17.3	21.1	9.4	16.0	20.8 21.9	8.1 8.3

Table 26-3 — 20 Ton — CGAD-C20

						intering	Condenser A	ir Tempe	rature (E	Degrees F)					
		75		85			95			105			115		
LWT (Deg.F)	Capacity (Tons)	Input KW	EER	Capacity	Input KW	EER	Capacity (Tops)	Input KW	EER	Capacity (Tons)	Input	EER	Capacity (Tons)	Input	EER.
40	18.7	16.0	12.3	17.8	17.7	10.7	16.8	19.6	9.2	15.8	21.8	7.9	14.7	24.2	6.7
42	19.3	16.2	12.6	18.4 -	17.9	11.0	17.4	19.8 -	9.5	16.3	22.0	8.1	15.3	24.4	6.9
44	19.9	16.3	12.9	19.0	18.1	11.2	18.0	20.0	9.7	16.9	22.2	8.3	15.8	24.6	7.1
45	20.3	16.4	13.1	19,3	18.1	11.4	18.2	20.1	9.8	17.2	22.3	8.4	16.1	24.8 -	7.2
46	20.6	16.5	13.2	19.6	18.2	11.5	18.5	20.2	9.9	17.5	22.4	B.5	16.3	24.9	
48	21.2	16.6	13.5	20.2	18.4	11.8	- 19.1	20.4	10.2	18.0	22.6	8.7	16.9	25.1	- 7.3
50	21.9	16.8	13.8	20.8	18.6	12.0	19.7	20.6	10.4	18.6	22.8	8.9			7.4
55	23.5	17.2	14.5	22.4	19.0	12.7	21.3	21.1	11.0	20.1	23.4	9.5	17.5	25.3	7.6
60	25.3	17.7	15.3	24.1	19.5	13.3	22.9	21.6	11.6	21.7	23.9	10.0	18.9	25.9	8.1

Table 26-4 — 25 Ton — CGAD-C25

				Entering	Condenser A	ir Temperature (D	egrees F)			
		75		85		95 😽		105 😽		115 %
(Deg F)	Capacity (Tons)	Input KW EER	Capacity (Tons)	input KW - EER	Capacity (Tons)	Input EER	Capacity (Tons)	Input KW ~ EER	Capacity	Input KW EER
40 · · · · · · · · · · · · · · · · · · ·	23.3 24.0 24.8 25.2 25.6 26.4 27.2 29.3	21.5 ~ 12.5	22.2 22.9 23.8 24.0 24.4 25.2 26.0 27.8	22.9 10.2 23.1 10.5 23.4 10.7 23.5 10.8 23.6 11.0 23.9 11.5 24.1 11.5 24.8 == 12.1	21.0 21.7 22.4 = 22.8 23.1 23.9 = 24.6 = 26.5 = 3.1	25.9 - 9.4 -	19.8	28.0 7.6 28.3 7.8 28.5 8.0 28.7 8.1 28.8 * 8.2 29.1 8.4 29.3 8.6 30.0 9.1	18.5	31.0 6.5 31.3 6.7 31.5 6.9 31.7 6.9 31.8 7.0 32.1 7.2 32.4 7.4 33.1 7.8 33.

Table 26-5 - 30 Ton - CGAD-C30

				Entering	Condenser A	ir Temperature (D	egrees F)			
		75		85		95 ~		105 -		115 -
LWT (Deg F)	Capacity (Tons)	Input: KW EER	Capacity (Tons)	Input KW · EER	Capacity (Tons)	input KW ** EER -	Capacity (Tons)	Input . KW = EER	Capacity	Input KW ≠ EER ★
40	27.9 5 28.8 29.8 30.3 30.7 31.7 32.7 35.2 37.9	24.4 12.2 24.8 12.5 24.9 12.5 25.0 12.9 25.2 13.1 25.4 13.3 25.7 13.6 26.4 14.3 27.1 15.1	26.8 27.5 28.5 28.9 29.4 30.3 30.1.3 33.7 36.3	27.0 10.6 27.2 10.9 27.5 11.2 27.7 11.3 27.8 11.4 28.1 11.7 28.4 11.9 29.1 12.6 29.9 13.2	25.3 26.2 27.1 27.5 27.9 28.8 27.2 29.8 29.3 34.6 29.8 29.8 29.8 29.8 29.8 29.8 29.8 29.8	29.8 = 9.2 30.1 = 9.5 30.4 = 9.7 30.6 = 9.8 30.7 = 9.9 31.0 = 10.1 31.3 = 10.4 32.1 = 10.9	23.9 = 24.7 = 25.6 = 26.0 ± 27.3 = 28.2 = 30.5	33.0 - 8.0 33.3 - 8.2 33.6 - 8.4 33.8 - 8.5 34.0 - 8.6 34.3 - 8.6 34.5 - 9.0 35.4 - 9.5	22.4 23.2 24.0 24.4 24.8 25.7 26.5 28.7	36.5 6.8 5 7.0 37.2 7.2 7.3 7.3 7.3 7.3 7.5 7.5 7.3 8.2 7.7 7.3 9.1 8.2 2.5

Notes:

1. 20-30 ton ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81, 10-15 ton ratings based on 0.00025 fouling factor per ARI 590-86.

2. Interpolation between points as permissible.

3. Extrapolation between points as permissible.

4. Kov input is for compressors only.

5. EER = Energy Efficiency Ratio, (But/watt-hour). Power inputs include compressors, condenser fans and control power.

6. Ratings are based on an evacoustor temperature drop of 10 F.

7. Derate capacity 1% for 208 volt cepration of 208-230 dual voltage units.

Performance Data

10-80 Tons Part Loac

					Entering	Condenser Air	Temperature (D			
Tons	Model Number	-	95 100% Load	87 80% Load	85 75% Load	79 60% Load	75 50% Load	71 40% Load	67 30% Load	65 ~ 25% Loed
		EER	9.5		_		11.6	_	_	_
10	CGA 120	Capacity (Tons)	8.8	_		_	4.8	_		_
		KW Input	10.1				4.0			
		EER	9.6				11.1	-	_	-
15	CGA 180	Capacity (Tons)	14.4	_	_	_	7.6	_	-	
	-	KW Input	17.0				7.1			
		EER	9.7		_	_	13.9	_	-	-
20	CGAD-C20	Capacity (Tons)	18.0	_	_	_	10.8	_	_	_
_		KW Input	20.0				7.1			
		EER	9.3	_	_	12.5	_	13.7	_	-
25	CGAD-C25	Capacity (Tons)	22.4	_	_	15.3	_	11.2	_	_
-		KW Input	25.8			11.6		6.7		
		EER	9.7	_	_	-	14.0	_	_	_
30	CGAD-C30	Capacity (Tons)	27.1	_	_	_	16.0	_	_	_
		KW Input	30.4				10.6			
		EER	9.7	-	11.2	_	14.1	_	-	15.0
40	CGAD-C40	Capacity (Tons)	35.2	_	28.1	-	21.4	-	_	10.9
		KW Input	39.6		25.4		14.0			6.4
		EER	9.3	10.8		12.6	-	_	14.0	_
80	CGAD-C50	Capacity (Tons)	44.4	37.8	_	30.6	_	-	15.7	_
		KW Input	51.6	35.4		23.2			10.2	
		EER	9.5	_	11.1	_	14.1	-	_	15.2
60	CGAD-C60	Capacity (Tons)	52.7	_	41.8	_	31.9	_	_	16.3
		KW Input	60.8		39.0		21.2			9.6
		EER	9.9		10.5	_	11.8	_	_	13.4
70	CGAC-C70	Capacity (Tons)	62.5	_	50.8	_	34.3	-		21.6
		KW Input	70.0		52.6		31.8			16.4
		EER	9.7	_	10.6		12.1	_	_	13.3
80	CGAC-C80	Capacity (Tons)	73.9	_	62.0		40.7	_	- ·	25.1
		KW Input	83.4	_	61.6		36.2			18.3

and the

Notes:

1. Table 29-1 data is rated in accordance with ARI Standard 590-81, Section 7.3.

4.4 F leaving chilled water temperature.

(55 F + 0.4 F x % Load) = entering embient temperature.

Constant evaporator waterflow as determined at full load operation at 95 F ambient and 10 F evaporator temperature was determined at full load operation at 95 F ambient and 10 F evaporator temperature in Load by compressor despectment as defined by ARI Standard 590-81.

2. Kwi input is for compressors only.

3. EER = Energy Efficiency Ratio, (Btu/watt-hour). Power inputs include compressors, condenser fans and control power.

Performance Data

90-129 Tone Part Load

93

Table 30-1 — Part Load Data, ARI Points (90-120 Tons)

					Entering Conde	nser Air Tempera	ture (Degrees F)		
Tons	Model Number		95 100% Load	88.3 83% Load	87.8 82% Load	86.2 78% Load	81.6 67% Load	80.6 64% Load	77.4 56% Load
90	CGAC-C90	EER -	10.0	-	_	10.8	-	_	12.3 .
30	CGACCEO	Capacity (Tons) KW Input	85.9 92.9	_	=	73.2 70.5	-	-	51.4 =
		EER ·	10.1	11.1		- 70.5	10.9		44.3
100	CGAC-D10	Capacity (Tons) KW Input	94.5 100.4	86.6	_	_	71.4	=	_
				82.6			64.4		_
110	CGAC-D11	EER	10.3	-	11.3	-	-	11.1	
	COAC-DII	Capacity (Tons) KW Input	105.6 112.3	-	95.5 90.5 ~	-	_	76.6	_
					30.3			69.1	
120	CGAC-D12	EER Capacity (Tons)	10.2	11.2	-	_	10.9	_	
0	JUNE 112	KW Input	114.2 122.6	104.0 100.7	_	_	85.2	_	_
			I Sale	100.7			79.0	-	_

Table 30-2 — Part Load Data, ARI Points (90-120 Tons)

		-			Entering	Condenser Air	Temperature (D	egrees F)		
Tons	Model Number		75 50% Load	73 45% Load	69.8 37% Load	68.3 33% Load	67 30% Load	62.6 19% Load	61.6 17% Load	61 15% Load
90	CGAC-C90	EER Capacity (Tons) KW Input	=	=	14.1 40.8 '== 28.7	=	=	14.0 21.9 18.7	=	
100	CGAC-D10	EER Capacity (Tons) KW Input	12.6 52.1 43.6	_	= -	14.4 41.2 28.3	=		14.3 22.0	= -
110	CGAC-D11	EER Capacity (Tons) KW Input		13.2 54.3 43.6			14.9 -> 42.4 28.1	=	14.3 — —	14.7 = 22.4 =
120	CGAC-D12	EER Capacity (Tons) KW Input	12.7 62.5 52.9	= -	=	14.3 - 48.6 34.9	·		13.2 25.3 18.8	14.1 ==

Table 30-3 — Integrated Part Load Values

Tons	Model No.	IPLV
10	CGA 120	11.3
15	CGA 180	11.0
20	CGAD-C20	12.7
25	CGAD-C25	124 =
30 :	CGAD-C30	128 ==
35	CGAD-C40	13.3
40	CGAD-C50	12.7
60	CGAD-C80	13.3
70	CGAC-C70	11.7
80 ~	CGAC-C80 -	11.8 🕾
90	CGAC-C90	12.5*
100	CGAC-D10	12.4
110	CGAC-D11	12.6* 2*
120 ~	CGAC-D12	12.3 -

Notes:

With the control of the control

2. Velues rated in accordance with ANSUASHRAEAES
Standard 90 1P

*50 ton compressor leads

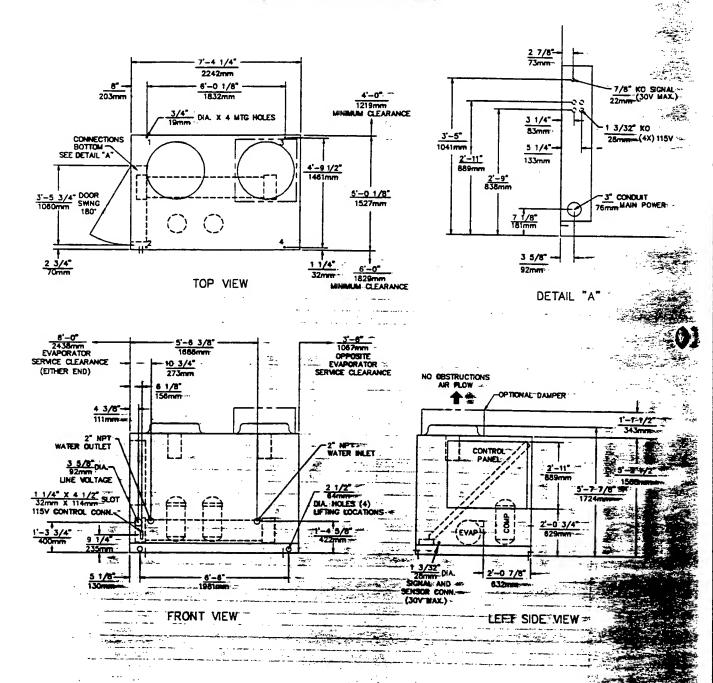
35 of 41 Eco B-8

Dimensional Data

20 Ton



Figure 44-1 — CGAD-C20 Unit Dimensions

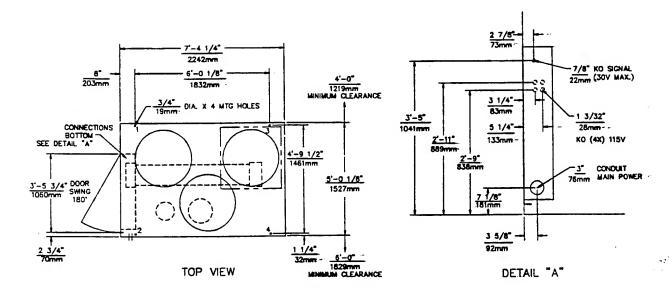


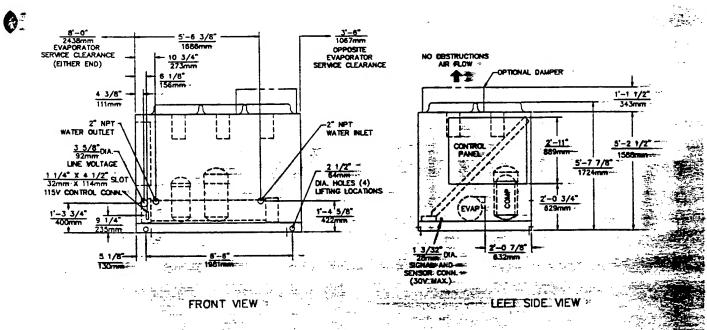
Dimensional Data

25 Ton

36 0=41 ECO B-8

Figure 45-1 — CGAD-C25 Unit Dimensions



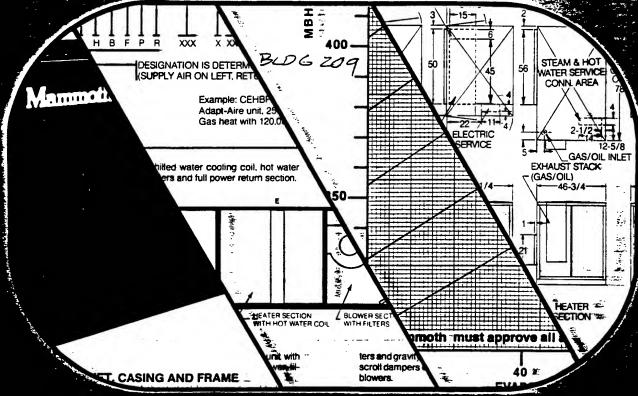


Commence of the second

Mammoth



10-60 TON



• SINGLE ZONE • MULTI-ZONE • VAV

HEATING & VENTILATING OSUPERMARKET UNITS OF

● 100% MAKEUP AIR ● HEATING & COOLING ●

■WATER & AIR SOURCE HEAT PUMPS

DUAL DUCT

UNIT DESIGNATION

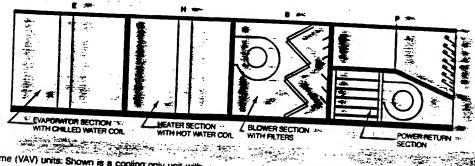
CONDENSING C SECTION (Remote Condensing Section designated RC) CA - AIR COOLED CONDENSING SECTION CW - WATER COOLED CONDENSING SECTION AIR SOURCE HEAT PUMP "A" SECTION WATER SOURCE HEAT PUMP "W" SECTION EVAPORATOR "E" SECTION HEATER "H" SECTION BLOWER "B" SECTION FILTER "F" SECTION (If Used As Option) POWER RETURN EXHAUST "P" SECTION RETURN "R" FIRST TWO DIGITS INDICATE NOMINAL TONNAGE (DX or CW) LAST DIGIT INDICATES NUMBER OF COMPRESSORS (E) ELECTRIC HEAT (S) STEAM HEAT (W) HOT WATER HEATING MEDIUM (G) GAS FIRED (L) LIGHT OIL FIRED G/L GAS/LIGHT OIL COMBINATION M.B.H. HEATING CAPACITY (Output) MULTI-ZONE OR DUAL DUCT (If applicable) NUMBER OF ZONES (If applicable) FRAME SIZE 1025 OR 2060 XXX - X XXX (MZ or DD XX) X

DESIGNATION IS DETERMINED BY ARRANGEMENT OF SECTIONS FROM LEFT TO RIGHT (SUPPLY AIR ON LEFT, RETURN AIR ON RIGHT)

CEHB-18/W258

Example: CEHBP 251 G 120 1025 Adapt-Aire unit, 25 ton capacity, one compressor, single zone. Gas heat with 120,000 BTU heat output and power return.

I. Typical single zone unit with chilled water cooling coil, hot water heating coil, supply air blower, filters and full power return section.



II. Variable air volume (VAV) units: Shown is a cooling only unit withcondenser, direct expansion evaporator coil, supply air blower, fil-

ters and gravity return air compartment. VAV units use either outlet or scraft dampers on TFC blowers or inlet vanes on single airfoit (SAD)



جعا ورثيارها بالسابطين مام

EVAPORATOR SECTION - WITH DIRECT

BLOWER SECTION WITH FILTERS

OUTSIDE AIR

· 阿里斯斯斯 (1) 经产品的

		••
Table 1	FRAME AA-1025—NOMINAL	CAPACITY AND MECHANICAL DAT
	1 112111 - 22-1053—140MINAL	CAPACITY AND MECHANICAL DA

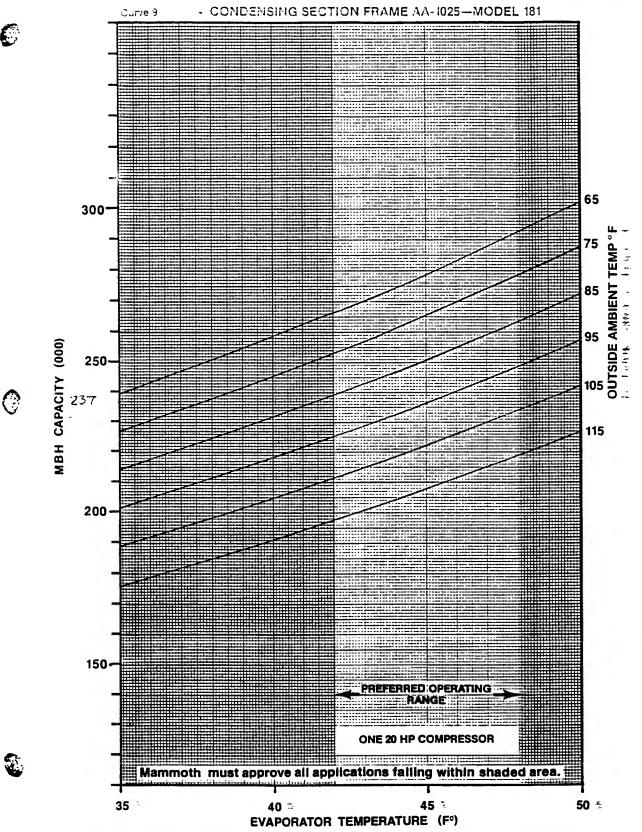
								•	
	MODEL NUMBER	111	112	151	162	181	201 -	202	251
	Nominal C F M Sz	4 500	4 500	6.100	6 300	7 200	8 000	8 000	10 500
	Nominal CFM Mz	4 500	4 500	6.100	6 300	7 200	8 000	8,000	8 000
	Nom. Tons Sz/Mz	116/116	113/113	153/153	158 158	20 3 / 20 3	232/232	230/230	27 9 27
	Compressor No /HP	(1) 10	(2) 5	(1) 15	(2) 7-1 2	(1) 20	(1) 25	(2) 10	(1:30
	Compressor Type	1	<u> </u>	ــــــــــــــــــــــــــــــــــــــ	Semi	rermetic	ــــــــــــــــــــــــــــــــــــــ	L	
	Compressor KW Input*			1	T		Γ	T	
_	95°F Ambient	1	j		1		1	İ	
₫	80°F/67°F	139	152	18.8	20 4	21 4	27 2	277	31 4
ธ	Capacity Reduction (Optional)			Compre	eear Unloedin	or Hol Gas B	YDASE		·
CONDENSING SECTION	Steps of Unloading (Optional)	100-67-0	100-50-0	100-67-0	100-50-0	100-50-0	100-50-0	100-67-50- 33-0	100-67-33
Ę	Condenser Coil Area Sq. Ft	142	18.3	283	283	283	33.3	33.3	33.3
Ę	Condenser Coil Rows	3	2	2	2	3	3	3	3
•	Condenser Fans No./Size—Inches	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1:42
3	Condenser Fan HP	2	2	2	2	2	3	3	3
	Condenser C F M	8.500	11,000	13.700	13.700	12.800	14,900	14 900	
	Water Cooled	0.000			Mammoth Se				17 000
_	Direct Expansion Coil	 	744	- Acidi N		LANGUAGE RAIL W	even COOled C	araiog	
	Face Area—Sq. Ft. Sz./Mz.	10.0/10.0	100/100	13.3/13.3	133/133	133/133	13.3/13.3	133/133	175 133
	Standard Rows & Fins Sz /Mz	3E/3E	3E/3E	3E/3E	3E/3E	4E/4E	4F/4F	4F/4F	4E 6E
	Nominal Capacity MBH Sz./Mz.	1	32.02		52.52		41 / AF	4F/4F	4C 0E
RCTION	@ 80°F/67°F 95°F Ambient	139/139	135/135	184/184	190/190	243/243	278/278	276/276	335 325
2	Optional Rows			•	3.4.546R	ows Available			
-	Optional Fins	1				Available			
	Chilled Water Coil	 		1	0.207	~~~			
	Face Area—Sq. Ft. Sz /Mz.	98/98	98/98	13.1/13.1	131/131	131/131	13.1/13.1	131/131	171 131
_	MBH Natural Gas Heat Output Range			100 Multi Zoni		1011101	13.7713.7	131/131	171 137
	MBH Oil Heat Output Range			100 Multi Zone					
	MBH Propane Heat Output Range								
	MBH Electric Output Range	120-300 Sing	4 LUNE. 235-	100 Multi Zone					
	At 460 Volts	114-950 Sing	le Zone, 114-9	950 Multi Zone	,				
	MBH Range for Hot Water Coil Based on 200° Water ∆T 20° and 60°F/Air	70-800 Single	Zone. 125-54	10 Multi Zone					
1 11 1	Hot Water Coil Size—Sq. Ft	130 Single Zo	ne. 8.4 Multi	Zone					
-	Optional Rows				1.2	3 & 4			
	Optional Fins				C. E	& F			
	MBH Range for Sleam Coil Based on								
	2# Sleam and 60°F Air	230-790 Sing	e Zone. 185-6	23 Multi Zone	-				
	Steem Coil Size—Sq. Ft.	130 Single Zo	ne. 8.4 Multi 2	Cone					
	Optional Rows				1.6	. 2			
	Optional Fins				C				
П	Nominal CFM	4,500	4.500	6,100 -	6,300 -	7.200	8.000	8.000	10.500
L	Blower Number & Size	(2) 12x12	(2) 12x12	(2) 12×12	(2) 12×12	(2) 15×11	(2) 15×11	(2) 15×11	
	Norminal Motor Size**	1-1/2	1-1/2	3	3	5	5		(2) 15x11
7.82	Maximum C.F.M.***	6.250	6.250	8.310 ·	8.310	8.310		5 0 210	7-1 - 2
H	Nominal C.F.M.	4.500	4,500 -				8.310	8.310	11.000
	Blower Number & Size			6.100	6.300 /=	7200	8.000	8.000	8.000
밁	Nominal Motor Size **	(2) 12×12	(2) 12×12	(2) 12×12	(2) 12x12	(2) 15x11	(2) 15x11	(2) 15×11	(2) 15x11
1		1-1/2	1-1/2	3	3	5	5	5	5
Ч	Maximum C.F.M.***	6.250	6.250 - 3	8,310 -	8.310	8.310	8,310	8.310	8.310
7	Filters -				See FILT				
١	fsolation (Optional)	<u> </u>			Spn				
	HP Renge	L				0 😕			
_ļ					(2) 15	at 1			
71	Blower No./Size				(-, -,				
3	Blower No./Size Sec.				4.000-1				
3	Blower No./Size					0.000			
Š	Blower No./Size Sec.				4.000-1	0.000			
Š	Blower No./Size C.F.M. Renger Masumum E.S.P.				4.000-1 1: 1/2—	0.000 2 F-1/2			
Š	Blower No./Size CFM. Range Maximum ESP. HP Range				4.000-1	10.000 2 F-1 /2 Send			

^{***}Based on a maximum evaporator face velocity of 625 FPM.

[&]quot;Blower horsepower based on CEHB unit with nominal evaporator DX coil, elected heat, 2" throwevery filters and 0.50" ESP

[&]quot;KW based on total system operating point at C.F.M. and total capacity listed in this table- and at the conditions stated, in

Actual equipment for horsestantes less than the indicated for motor horsespones.



For VAV MZ or 100% outside air applications select high evap. temp. at design conditions.

Table 29

FRAME 1025—CONDENSER ELECTRIC DATA

Table 20	1		00110	CITOLII.		57.	•	
				MODEL				
	111	112	151	162	181	201	202	251
ELECTRICAL			 					
Compressors FLA #1	411	20 4	603	31 7	709	879	411	104
*2		204		31 7			411	
208v LRA #1	208	141	284	145	308	158	208	170
22		141		145	1		208	l
Congenser Fans FLA (ea)	58	58	7.5	7.5	75	106	106	106
LRA (ea)	33 2	332	431	431	431	59 7	59 7	59 7
Total FLA	46.9	46.6	678	709	78 4	98.5	928	1146
Compressors FLA #1	372	185	54 5	28 7	64 1	79.5	37 2	94
= 2		185		28 7			372	
230v LRA #1	208	141	284	145	308	428	208	470
#2		141		145			208	1
Condenser Fans FLA (ea.)	52	52	68	68	68	96	96	96
LRA (ea.)	30	30	39	39	39	54	54	54
Total FLA	15.4	422	613	642	709	891	840	1036
Compressors FLA #1	185	92	25	143	321	39 7	185	47
=2		92	1	143	}		185	
460v LRA #1	104	62.5	144	725	154	214	104	235
۵2		62 5		725			104	.1
Condenser Fans FLA (ea)	26	2.6	34	34	34	18	48	18
LRA rea r	15	15	198	198	198	27	27	27
Tolai FLA	21.1	210	28 4	320	35 5	44.5	418	518
Compressors FLA #1	147	7.4	20	115	25 6	318	147	376
± 2		7.4		115	1	1	14.7	
575v LRA #1	38.2	53.4	127	58	135	160	88.2	200
#2		53 4	1	58	l	1	88.2	1
Condenser Fans FLA rea r	21	21	2.7	2.7	27	39	39	39
LRA (ea)	12	12	156	156	156	24	24	24
Total FLA	168	169	22.7	25.7	283	35 7	33.3	415

Table 30

FRAME 2060—CONDENSER ELECTRIC DATA

						ODEL					
Ţ	221	222	261	262	301	302	351	352	452	502	802
ELECTRICAL											
Compressors FLA #1	879	41 1	104	411	133.3	60.3	150 4	709	879	104	133.3
#2		41.1		603	1	603		709	879	104	1333
208v LRA#1	428	208	470	208	565	284	625	308	428	470	565
=2		208		284		284		308	428	470	565
Condenser Fans FLA (ea.)	58	58	58	58	7.5	58	75	75	106	106	168
LRA (ea)	33.2	332	33.2	33.2	431	332	431	431	59.7	597	99.5
Total FLA	99 5	938	1156	1130	1483	1322	165 4	1568	1970	2292	300 2
Compressors FLA #1	79.5	372	94	37.2	1205	545	136	641	795	94	1205
= 2		372		54 5		54.5	1	64 1	79.5	94	1205
230v LRA #1	158	208	470	208	565	284	594	308	428	470	565
*2		208	1	284		284		308	428	470	_565
Condenser Fans FLA (ea.)	52	52	52	52	6.8	52	68	68	96	96	152
LRA (ea)	30	30	30	30	39	30	39	39	54	54	90
Total FLA	89 9	848	1044	102.1	1341	1194	1496	1418	1782	2072	2714
Compressors FLA #1	39 7	185	17	18.5	60.3	25	68	32 1	397	47	603
=2		185	İ	25	1	25		32.1	39 7	47	603
460v LRA #1	214	104	235	104	283	144	297	154	214	235	283
#2		104		144		144		154	214	235	283
Condenser Fans FLA (ea.)	26	26	26	26	3.4	26	3.4	3.4	48	48	76
LRA (ea.)	15	15	15	15	198	15	198	198	27	27	45
Total FLA	149	422	52.2	487	671	55.2	748	710	890	1036	1358
Compressors FLA #1	31.8	147	37.6	147	48.2	20	54.4	25.6	318	376	482
45		147		20		20	.1	25.6	31.8	37.6	482
575v LRA #1	160	88 2	200	88.2	230	127	225	135	160	200	230
= 2		88 2		127	1	127		135	160	200	230
Condenser Fans FLA rea	21	21	21	2.1	2.7	2.1	2.7	27	39	3.9	61
LRA (ea)	12	12	12	12	15.6	12	156	156	24	24	36
Total FLA	36 0	336	418	38.9	53.6	442	59.8	56.6	71.4	830	108 6

Table 31

BLOWER MOTOR ELECTRIC DATA

BLOWER MOTOR	8					HORS	E POWER					
LECTRICAL		3/4	1	1-1/2	2	3	5	7-1/2	10	15	20	25
208v	FLA LPIA	3 1 18 6	40 232	5 8 33 2	75 431	10 6 59 7	16.8 99.5	24.3 146.0	31 0 179 1	46.4 265.4	59.7 345.0	75 2 424 6
230v	FLA LRA	28	36 21	52	6.8 39	9.6 54	15.2 90	132	28 162	42 240	54 312	68 384
460√	FLA LRA	1 4 8 4	18 108	26 15	34 198	48 27	7 6 45	11 66	14 84	21 120	27 156	34 192
575v	FLA LRA	11	14	21	27 156	3.9 24	6 1 36	9 54	11 66	17 96	22 126	27 156

NOTE: FULL LOAD AMPERES (FLA) AND LOCKED ROTOR AMPERES (LRA) VALUES ARE PER THE NATIONAL ELECTRIC CODE. ACTUAL PRODUCTION UNITS MAY DIFFER SLIGHTLY FROM THE ABOVE DUE TO MOTOR MANUFACTURER'S NAMEPLATE DATA.

Keller & Gannon

COMPUTED BY XS	ECO # B-9	PROJECT FHL BEAP
CHECKED BY	RECOVER WASTE-HEAT	16-403-10
DATE FEBRUARY 1993		SHEET NO SHEETS
	WEOV	· · · · · · · · · · · · · · · · · · ·
DESCRIPTION OF	WORL	
	OF WASTE-HEAT PECOVER	LY WERE EVALUATED
FOR THIS OF		
THE EIRST O	PPORTUNITY CONSIDERED !	WAS HEAT RELOVEDY
FROM FUE		
THE SECOND	OPPORTUNITY CONSIDERE	D WAS HEAT RECOVERY
	IDITIONING EQUIPMENT.	
1.) FLUE GA	S HEAT RECOVERY	
HOT FLUE GA	isses from fired equipm	ENT CONTAIN
	LE HEAT! HEAT EXCHANGE	
	N FLUES TO PREHEAT FEE	
DOMESTIC HOT	WATER MAKE-UP HEAT	CAN BE PELOVERED
UP TO THE R	ONT WHERE THE FLUE G	S TEMPERATURE
REACHES_ITS		
TWO TYPES OF	RETROFITS WERE EVALUA	ATED.
	ERS (LARGER THAN	STU/HP.)
	TED FOR RETROFITING W	ITH ENGINEERED
	Y AWAILABLE ECONOMIZER	
	ers were not consider	
	TROPIT DECAUSE OF UNA	
	lf' ecolomizers and t	E COST OF
FIELD FABRI	CATED UNITS	
2.) A/C UNIT	HEAT RECOVERY	
	NING SYSTEMS FEATURING	
	AND CONDENSER FUNCT	
•	FOR THE INSTALLATION	
HOT WATER	MAKE-UP PREHEATER	

Keller & Gannon

COMPUTATION SHEET

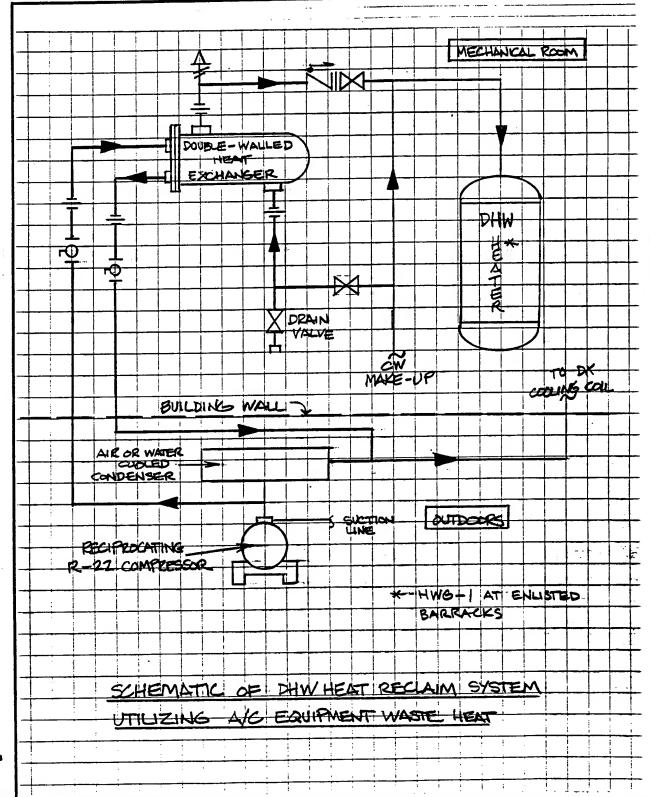
Engineers-Architects

TED BY	<u> </u>				10-	403-10	•
FEBRUAR	Y_1993	RECOVE	r a/c sys	TEMS			
	19	WASTE	HEAT FOR	DHW	SHEET NO	2_0F_	SH
DERADIE	mai he	MAP	- CONTIN	I IEN			
レンスパ	TICK OF			WDU			- :
		_ ·			4=15 C L	a =	<u> </u>
			e condition				:
	-		70 ASSI				
COLD	WATER_A	NAKE-UP	10 THE	DOMES	TIC HO	TWATE	X _
SYSTE	M .				· · · · · · · · · · · · · · · · · · ·		
THIS	PRORTUN	OVAL YTH	LVES THE	INSTALL	ATION.	OF A:	
REFRU	GERANT	TO: DHW	HEAT EXC	HANGE	2 111 7	ARALLE	<u></u>
·•			CUNIT'S				
	D' CONDE	•					
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01-14-14	TO 2 TA 55 4	C 0500	0= 3413		K CONTRACTOR	134612727	
PLUMB	ING CODE	es recou	RE THAT	THE HE	AT EXC	HAVGER	
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BE D	DUBLE-V	WILED	to preven	JT CON'	MINA	TON OF	
				UT CONT	MINA	ILON OF	
		WATER		UT CON'	EM [NA]	TON OF	
THE !	OMISTIC	WATER	SUPLY.		•		
THE !	OMISTIC	WATER			•		
THE !	OMISTIC	WATER	SUPPLY.	E MINI	MAL 5	INCE	
CONTR	DOMISTIC VOLS FOR REFRIGE	WATER 2 1HIS S ERANT WI	SUPPLY. SYSTEM AR	E MINI 14E	MAL S	INCE XCHING	
CONTR	DOMISTIC VOLS FOR REFRIGE	WATER 2 1HIS S ERANT WI	SUPPLY.	E MINI 14E	MAL S	INCE XCHING	
CONTR THE MOST	OMBTIC COLS FOR REFRIGE ABLE	WATER 2 THIS S RANT WITH CONDU	SUPPLY. SYSTEM AR	E MINI TUE L'REER	mal 5 Heat e	INCE XCHANG IT	ER
CONTR THE MOST	OMISTIC OUS FOR REFRIGE ABLE CONDENS	WATER 2 17-115 S ERANT WITO CONDE	SUPPLY. SYSTEM AND ILL SEEK ENSE THE	E MINI 14E REFR D COOL	mal 5 Heat e IGERAA	ince Exchang It	6K
CONTROLL THE MOST THE WILL	OMISTIC OUS FOR REFRIGE ABLE CONDENS HAVE A	WATER 2 17-115 S ERANT W TO CONDE SER MOSS -LOWER	SUPPLY. SYSTEM AN ILL SEEK ENSE THE TABLE TO PRESSURE	LE MINI THE PEER D' COOL 'AS MO	MAL S HEAT E IGERAA THE PE SE GAS	INCE EXCHANG IT. EFICERA CONDE	iek Nit
THE DOWNER THE MOST	CONDENS LOUID,	WATER 2 1HIS S ERANT WITH CONDE SER MOST LOWER THUS AU	SUPPLY. SYSTEM AND SYSTEM AN	TE MINI THE REFR D COOL AS MO	MAL S HEAT E IGERAA THE PE SE GAS WING A	INCE EXCHANG IT. EFICERA CONDE	iek Nit
THE DOWNER THE MOST	CONDENS LOUID,	WATER 2 1HIS S ERANT WITH CONDE SER MOST LOWER THUS AU	SUPPLY. SYSTEM AN ILL SEEK ENSE THE TABLE TO PRESSURE	TE MINI THE REFR D COOL AS MO	MAL S HEAT E IGERAA THE PE SE GAS WING A	INCE EXCHANG IT. EFICERA CONDE	iek Nit
CONTRACTOR MOST THE WILL TO L REFR	COMPENS ABLE COMPENS HAVE A LIGHTLE	WATER 2 17-115 S ERANT WITO CONDE SER MOSS LOWER THUS AUTOMORY	SUPPLY. SYSTEM AND SYSTEM AN	LY DEAK	MAL S HEAT E IGERAA THE PE SE GAS WING A	INCE EXCHANG IT. EFICERA CONDE	iek nut use
CONTRACTOR MOST	COMPENS HAVE A HE FOLL	WATER 2 17-115 S ERANT WITO CONDE SER MOSS 1-LOWER THUS AUTOMORE THUS AUTOMORE DWING P	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	LY DEAK	MAL S HEAT E IGERAA THE PE SE GAS WING A	ANCE EFICERA CONDE AORRE H	iek Nit
CONTRACTOR CONTRACTOR	CONDENS HAVE A LIGUID RECLAIN	WATER 2 17-115 S ERANT WITTO CONDE SER MOST LOWER THUS AUT TO CONS THUS AUT DWING P	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	LY DEAS	MAL 5 HEAT E IGERAM THE RE SE GAS WING M	INCE EXCHANG IT. EFIGERA CONDE MORRE H	iek Nit
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CONTRACTOR CONTRACTOR	CONDENS HAVE A LIGUID RECLAIN	WATER 2 17-115 S ERANT WITTO CONDE SER MOST LOWER THUS AUT TO CONS THUS AUT DWING P	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	A DVAG	MAL S HEAT E IGERAM THE RE SE GAS WING M	ACE EXCHANG IT EFICERA CONDE MORRE H	16-T
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CONTRACTOR CONTRACTOR	COMPENS HAVE A LIGUID, HE FOLLO	WATER 2 17-115 S ERANT WITTO CONDE SER MOST LOWER THUS AUT TO GAS TO DWING P	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	A DVAG	MAL S HEAT E IGERAM THE RE SE GAS WING M	INCE EXCHANG 197. EFICERA CONDE MORRE H	16-T
CONTRACTOR THE MOST	COMISTIC POLS FOR REFRIGE ABLE CONDENS HAVE A LOUID, RECLAIN	WATER 2 17-115 S ERANT WATER TO CONDE SER MOST LOWER THUS AU TOMOS P A SYSTEM	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	E MINI 74E PEER COOL AS MO LY DIPA ON DENSE	MAL S HEAT E IGERAM THE RE SE GAS WING M	ANCE EFICERA CONDE ANCE F-1148	16-T
CONTRACTOR THE MOST THE WILL TO: L REFR SEE T HEAT	COMISTIC POLS FOR REFRIGE ABLE CONDENS HAVE A LOUID, LOSUID, RECLAIN	WATER 2 17-115 S EPANT WITTO CONDE SER MOST LOWER THUS AUT TO SYSTEM	SUPPLY. SYSTEM AN ILL SEEK ENSE THE T'AGLE T PRESSURE TOWATICAL PITHAT (PEER COOL AS MO	MAL S HEAT E IGERAM THE RE SE GAS WING M	ANCE EFICERA CONDE ANCE F-1148	MER NSE 161
CONTRACTOR THE MOST	COMISTIC POLS FOR REFRIGE ABLE CONDENS HAVE A LOUID, LOSUID, RECLAIN	WATER 2 17-115 S ERANT WITO CONDE SER MOSS LOWER THUS AUTOMORY THUS AUTOMORY DWING P	SUPPLY. SYSTEM AN ILL SEEK ENSE THE T'AGLE T PRESSURE TOWATICAL PITHAT (A. DVAG	MAL S HEAT E IGERAA THE PE ZE GAS WING A	INCE EXCHANG 197. EFICERA CONDE MORRE H	MER NSE 161
CONTRACTOR THE MOST THE WILL TO L REFR SEE T HEAT	COMPENS REFRIGE ABLE CONDENS HAVE A LOUID, RECLAIN	WATER 2 17-115 S ERANT WITO CONDE SER MOSS LOWER THUS AUTOMORY THUS AUTOMORY DWING P	SUPPLY. SYSTEM AND AND AND AND AND AND AND AND AND AND	LY DEAL	MAL S HEAT E IGERAN THE RE SE GAS WING M	ANCE EXCHANG 17. EFIGERA CONDE ANCE H	NSE NSE
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CONTRACTOR THE MOST THE WILL TO L REFR SEE T HEAT	COMISTIC POLS FOR REFRIGE ABLE CONDENS HAVE A LOUID, RECLAIN	WATER 2 17-115 S ERANT WITO CONDE SER MOSS LOWER THUS AUTOMORY THUS AUTOMORY DWING P	SUPPLY. SYSTEM AN ILL SEEK ENSE THE T AGLE T PRESSURE TOMATICAL AGE FOR	LY DEAL	MAL S HEAT E IGERAN THE RE SE GAS WING IN	INCE EXCHANG 17. EFIGERA CONDE MORRE H	NSE NSE
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FORM 101-1/8

Keller & Gannon

COMPUTED BY	ECO # 89	PROJECT FHL EFAP
CHECKED BY	RECOVER A/C SYSTEMS	
DATE	WASTE HEAT FOR DAW	SHEET NO. 3 OF SHEETS



Keller & Gannon

COMPU CHECK DATE	44	ECO #		PROJECT FHL E	
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Keller & Gannon

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9E	AVED RYEAR =	- \oox 15	CAP	DAH 7	x (90-	ZAHRS 55)×	P:110-	
9E	AVED RYEAR =	- \oox 15	CAP	DAH 7	x (90-	ZAHRS 55)×	P:110-	
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9e	WED RYEAR = IL BIU YR : 30	BO MIL BOLLS	STHE FUR	LUSED T	K (90-	55) x 1x 150/yr	op.16	7

CONSTRUCTION COST ES	February	1993 Sheet Of					
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study						for dealer con-	
Fort Hunter-Liggett, California					Code A	(no design com	(peted)
Engineer-Architect					f		
Keller & Gannon							
Drawing No.	-	Estimate	or		Checked	Ву	
ECO-B9 A/C Equip. Heat Reclaim		entity	Γ	Labor Material			1
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total == Cost
Double-Walled Heat Exchanger	1 1	EA	•	\$200	-	\$5,000	\$5,200
4.4 (0) 0.1 0.1 0.1 0.1 0.1 0.1 0.1			60	6050	60	6040	0.400
1 1/8" cu tubing/Insulation	90	LF	\$3	\$250	\$3	\$248	\$498
3/4" cu tubing/Insulation	90	LF	\$2	\$180	\$2	\$180	\$360
O/T OG MONIG/INSUIGNON	+ 30		42	Ψ100	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	4100	- 4000
2" Black Steel Pipe	40	LF	\$4	\$140	\$6	\$244	\$384
Cu Fittings	1	LS	•	\$50	-	\$25	\$75
			Ų.	•			
Steel Fittings	1	LS	-	\$500	-	\$250	\$750
Hamana (Ourse and				4000		4000	A 400
Hangers/Supports	1	LS	-	\$200	•	\$200	\$400
**************************************	-						
	1						
				-			
			biō				
Subtotal							\$7,667
Sales Tax @ 8%	1		شد	F.			\$613
Subtotal	1					-	\$8,280
Contractor OH & Profit @ 30%							\$2,484
Subtotal	-						\$10,764
Bond @ 1% Subtotal							\$108
Subtotal Estimating Contingency @ 10%	 						\$10,871 \$1,087
Total Probable Construction Cost							\$11,959
Total Flobable Collaboration Cost	 						Ψ11,505

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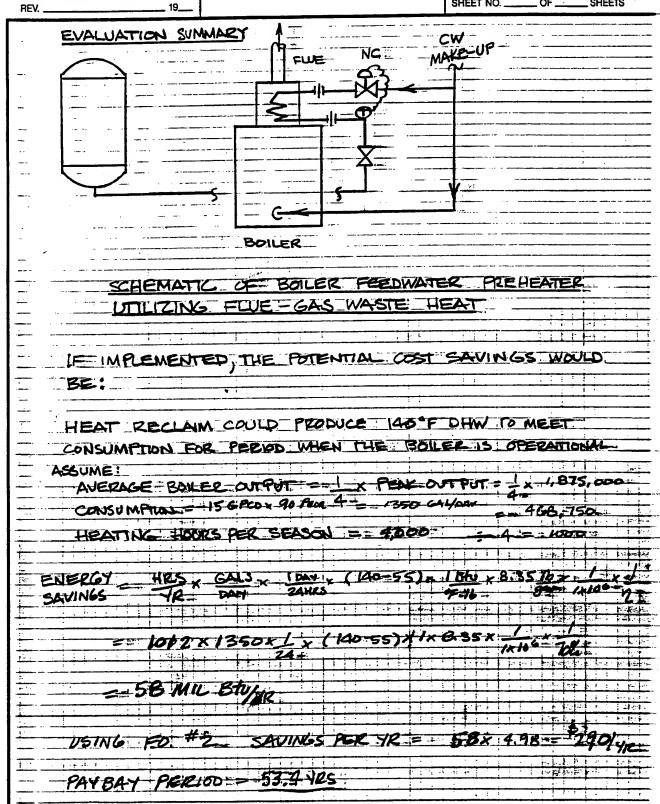
Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ocation:	Fort Hunter Ligg	ett. California	Region No. 4		Project No. 1	6-403-10 🐃
rolect Title:	ECO-B9 A/C Eq		•		Fiscal Year	
•	tion Name:	Building 205				
	e: March 1993		Economic Life: >>	15 YEARS	Preparer: KEL	LER & GANN
y	o. Maran 1000					
. Investmen	t Costs					
. Construct	ion Costs		\$12,000			
. SIOH			\$660	-		•
. Design Co	ost		\$ 0 *			
. Total Cos	t (1A+1B+1C)	•	\$12,660			
	alue of Existing Eq			\$0 ₹		
	ity Company Reba			\$ 0 ≛		
i. Total Inve	stment (1D-1E-1F)				\$12,660	1
						`.
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Foot				
ale of NIS I	IN 03-32/3-A US90	IOI DISCOURT PACE	A-5			en en en en en en en en en en en en en e
norm	Costan	Saving	Annual \$::	Discount:	Discounted a	
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	4/ML10U/(1)	MBFU/ IN(E)	candele)		- Caralago)	The second second second second second second second second second second second second second second second se
. Elec.:	\$18.23	0 3	\$0.00	11.70	\$0.2	
. Dist	\$4.98	30 -	\$149-	13.78	\$2,059	
. Propane		0 >	\$0.85	14.16	\$0.3	
. Other ~	NA-	0 .9.	\$0.5	NA=	NA.	
Demand S			\$01	11.70	\$0 \$	
. Total :		30≇	\$149-		\$2,059	
				• 0	·	e de la companie de l
Non Energ	y Savings (+) or C	iost (-):				· · · · · · · · · · · · · · · · · · ·
Non Energ	y Savings (+) or C	iost (-):		•		
Annual Ro	curring (+/-)	- St ***	\$0:4:		et isas i	
Annual Ro		- St ***	\$0:0	11.12	+7 (+4) (
Annual Re) Discount I	curring (+/-)	3	\$0.8	11.12	-thousand	
. Annual Ro) Discount I) Discounts	curring (+/-) Factor (Table A) d Savings/Cost (3/	A x 3A1)	\$0-	11.12	\$0.50 4.40 4.40 4.40 4.40 4.40 4.40 4.40	
Annual Re) Discount I) Discounts	curring (+/-)	A x 3A1)	\$0-8	11.12	\$0.5	
Annual Ro) Discount I) Discounts	curring (+/-) Factor (Table A) d Savings/Cost (3/ ming Savings (+) o	A x 3A1} ir Cost (-)				
Annual Re) Discount i) Discounte .Non Recur	curring (+/-) Factor (Table A) d Savings/Cost (3/ ming Savings (+) o	A x 3A1) ir Cost (-) Yearof	Discount we	Dollowarded Sa		
Annual Re) Discount i) Discounte Non Recur	curring (+/-) Factor (Table A) d Savings/Cost (3/ ming Savings (+) o	A x 3A1} ir Cost (-)				
Annual Re) Discount i) Discounte .Non Recur	curring (+/-) Factor (Table A) d Savings/Cost (3/ ming Savings (+) o Savings(+) Cost(-)(1)	A x 3A1) r Cost (-) Year of Occur. (2)	Discount as Factor(3)	Doscousted Sa ings(+)Cost(-)(
Annual Ro) Discount I) Discounte Non Recur	curring (+/-) Factor (Table A) d Savings/Cost (3/ ming Savings (+) o Savings(+) Cost(-)(1)	A x 3A1) r Cost (-) Year of Occur. (2)	Discount as: Factor(3):	Doscounted Sarings(+)Cost(-)(
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Annual Ro) Discount I) Discounte Non Recur	curring (+/-) Factor (Table A) ad Savings/Cost (3/ ming Savings (+) o Savings(+) Cost(-)(1) \$038 \$0.46 \$0.66	A x 3A1) r Cost (-) Year of Occur. (2) 15 ** 15 **	Discount ## Factor(3) ## 0.56 ## 0.58 ##	Doscoursed Satings(+)Cost(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(
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Annual Ro) Discount i) Discounte Non Recur	curring (+/-) Factor (Table A) ad Savings/Cost (3/ ming Savings (+) o Savings(+) Cost(-)(1) \$038 \$0.46 \$0.66	A x 3A1) Year of Coour. (2) 15 ** 15 **	Discount #: Factor(3) 0.56 0.56 0.56 0.56	Doscoursed Satings(+)Cost(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(-)(
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Keller & Gannon COMPUTATION SHEET

Eng	ineers	-Arch	itects
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COMPUTED BY	ECO # 89	PROJECT FHL EEAP
DATE FERENALY 1993 REV. 1993	RECLAIM WASTE HEAT	SHEET NO OF SHEETS



				Date Prepared		Sheet Of	
CONSTRUCTION COST ES	TIMAT	Έ		February '	1993		
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study							
Location					Code A	(no design com	peted)
Fort Hunter-Liggett, California Engineer-Architect					ł		
Keller & Gannon							
Drawing No.		Estimato	У		Checked	Ву	
ECO-B9 Flue gas Heat Reclaim				Labor		Asterial	
Line Item	No.	untity Unit	Per	·	Per ·		Total -
	Units	Meas.	Unit	Total	Unit	Total	Cost
	+-	LS		\$2,500	-	\$6,000	\$8,500
Boiler Economizer	1 1	L2		\$2,500	 	\$0,000	\$0,500
OT Other I Divers	90	LF	\$8	\$250	\$4	\$120	\$370
2" Steel Pipe	30	ILF .	20	事と30	Ψ4	φ I ZU	φ3/0
Notes and Finish	1	LS		\$500		\$500	\$1,000
Valve and Fittings	 	LO	-	\$500		\$300	Ψ1,000
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	1						
	1						
Subtotal							\$9,870
Sales Tax @ 8%					*		÷ \$790
Subtotal							\$10,660
Contractor OH & Profit @ 30%							\$3,198
Subtotal							\$13,857
Bond @ 1%							\$139
Subtotal							\$13,996
Estimating Contingency @ 10%							\$1,400
Total Probable Construction Cost							\$15,396

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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

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FORM 101-1/8

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title		gett, California quip. Heat Reclaim	Region No. 4		Project No. Fiscal Year	16-403-10 FY98 &
Discrete Po	rtion Name: te: March 1993	Building 205	Economic Life:	15 YEARS	Preparer: KE	LLER & GA
1. investme	nt Costs			_		
A. Construc	tion Costs		\$15,400			
B. SIOH			\$847	-n.		
C. Design C			\$0 -=	•		
	st (1A+1B+1C)		\$16,247			
	Value of Existing E			\$0 ₹		
	ility Comp any Reb			\$0 ≠		
G. Total Invi	estment (1D-1E-1F)			\$16,247	
2. Energy S	avings (+)/Cost(-):					
		d for Discount Facto	13	•		
Energy	Cost	Saving	Annual S	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
300203	4/M100/(1)	MIDTO, ITI(Z)	out and alo			
A Elec.	\$18.23	0 🛎	\$0.2	11.70	\$0=	فو <u>≠</u>
B. Dist	\$4.98	58 #	\$289	13.78	\$3,980	-2.5
C. Propane	\$7.87	0 /	\$0.2	14.16	\$0.2	
D. Other -	NA-	- - 0 *	\$0.2	NA-	NA =	. 7. %
E. Demand			\$0.77	11.70	\$0 2	i,
F. Total	Cavings =	58.38	\$289.		\$3,980	
		V	V	•	•	
3. Non Ener	gy Savings (+) or	Cost (-):		- -		
A. Annual Re	ecurring (+/-)		\$0 20			фС.
	Factor (Table A)	•		11.12		
	ed Savings/Cost (3				\$0.≆	1
•						12.2
B. Non Recu	uning Savings (+)	or Cost (-)				20
			· .			
Item -	Savings(+)	Yearsof ::	Discount #	Doecounted Sav-		7.47
	Cost(-)(1)	Occur(2)	Factor(3)	ings(+)Cost(-)(4)	12	
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8. st	\$0.3	15≇:	0.58 ≅	\$0:35		marker of profession
b. 🕸	\$0.5	15 🐲	0.56	\$0.25		
C. 🛳	\$0 E	15 ★	0.58 ★	\$0.≇	e *	
d. Total -	\$0	0	0.00	\$0		
	A STATE OF THE STA	ter entre de la lace				4
C Total Non		d Savings (3A2+3B	d4)	\$0=		
	14.75x 12.45	1. D. M. T.	1.12-11-		· Vaar -	
		A+(3Bd1/Economic	: LITE)): J		Years =	ا گورد. المحرور فار سرور المحرور فار سرور
	Discounted Saving			\$3,980		
6. Bavings to	investment Ratio	(SIR) 5/1G: 🛴		0.24 .	de .	

E Keller & Gannon

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CHECK	EBRUARY	B <i>IH</i> 1993	AUTOMATI	C BOILER	
REV		19		MPERS ON	SHEET NOOFSHEETS
			HVAC - H	W BOILERS	
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 			<i>DAJ</i>		

ECO BIO Sheet 20f8

Fac		Ë	ECOLECO BAO	B40 Engrav Savings	Aires								
Š	Installation Name			Propere	Fire Oil	Flooring	Description	10 1011	• 00		•		
		2		_	~	SYr	S.V.		S CO	Constr	Investment	Payback	SIR.
T 6	Family Housing NCO & Ent	Ł	╀	4-			\$7.70		24700	5531	\$500	78 O.4	Q.
P 41A	Family Housing NCO & Enl	L			ŀ	•			3	3	2000	50	2
P 41B	Family Housing NCO & Ent												•
P 42A	Family Housing NCO & Eni	_	4		•		•		•	•	•		1
P 42B	Family Housing NCO & Ent	\dashv											
P 43A	Family Housing NCO & Ent	!	•		•	•	•	•	•	•	ŀ	•	
P 43B	Family Housing NCO & Ent												1
P 44A	Family Housing NCO & Eni		•		•	•		1.					
P 44B	Family Housing NCO & Ent	•						,				•	•
P 45A	Family Housing NCO & Enl	L			•			ľ					
P 45B	Family Housing NCO & Ent									1		•	•
P 46	Family Housing CG & WO	L	•	•	•			1					
P 47	Family Housing CG & WO		•	•	ŀ	1	•	ľ					•
P 51A	Family Housing NCO & Fri	Ļ									•	,	•
P 518	Family Housing NCO & En			,		•	•	•	•	•	•	•	•
P 52A	Family Housing NCO & En	1											
P 52B	Family Housing NCO & En	<u></u>	<u>.</u>		•	•	•	•	•	•	ı	•	•
P 53	Family Housing CG & WO	Ļ	-	•	·	T							
75.0	Family Housing Co. P. WO	Ļ							٠	•		•	•
3 2	OM & DO BIIIEDOLI AIIII	+		•		•	•		•	٠	•	•	•
3 2	railly nousing CG & WO	+		•	•		•	•	٠	•	•	•	•
8	Family Housing CG & WO	4	•			٠	٠	•	•	•	•	•	•
P 5/	Family Housing CG & WO	4	•		1	•	•	•	•	•		•	•
88	Family Housing CG & WO	4	•			•	•	·	•	•	•	•	•
2 2	Family Housing CG & WO			•	•	•		•	•	•	•	•	•
8	Family Housing CG & WO		•	•	•	•	•	ŀ			•		•
S 79	Post Office, Main		•	·	٠	•	•	•	•	•	•	•	
8	Exchange, Main Retail		1	1.2	•	•	\$9.41	•	\$133	\$541	\$603	64 07	030
P 8	Theater with Dressing Rm's		-	•	•		•		•	-	•		
P 101	Open Din Cons (Hacienda)		•	23.5	•	•	\$184.99		\$2,619	\$1,136	\$1,267	6.85	2.07
	Club (Bar)						_						
	Haclenda, East Rooms												
	Haclenda, West Rooms												
P 116	Statio	+	-		·	•	•			•	ŀ	·	•
=	(Non-shop areas)	_											
F -	Fire Station - Office	` .	1.30 2.30 2.30 2.30	12.7	•	•	\$123.44	•	\$1,748	\$1,082	\$1,206	9.77	1.45
	Fire Station - Garage			\$: •					-	-i		~ - -	:
								_	-				
-	~	Ε.		• • •		•							

3	-1		3	B10 Energy Savings:	- 1	matic Flue	Automatic Flue Dampers						
<u>ė</u>	Installation Name	9 E	KWHY	Propane MII BTUM	Fuel Oil Mil BTUY	Electric \$77r	Propane \$77r	Fuel Oil	Saved	Constr	Investment	Payback Veers	SIR
T 121	Bowling Center			1.1		•	\$8.48		\$120	\$568	\$633	74.66	0.19
	•						-						
T 124	Family Housing LC & MJ		•			•	•	•	•	•	•	•	1
T 127	Officers Quarters Military	_	•	4.4	•	•	\$34.81	•	\$493	\$541	\$603	17.33	0.82
P 128	Officers Quarters Military		•	13.1	·	•	\$102.89	•	\$1.458	\$568	\$633	6.15	2.30
T 131	Family Housing CG & WO		•	0.9		•	\$7.04		\$100	\$531	\$592	84.10	0.17
S 144	Gymnasium	L		·		•	•		•	•	•	•	
S 146	FE Facility		·	•			'	ľ	•	•	•	•	
T 149	Family Housing NCO & Enl		_	2.5	•	•	\$19.47		\$276	\$531	\$592	30.42	0.47
T 156	FE Facility - Shop		•	·	•		•	•	•	·		•	'
	FE Facility - Office												
T 158	Vehicle Storage		·	•	•	•	•	•	•	•			
T 161	Admin General Purpose		•	•	•	•	•	•	•		•	<u> </u>	
T 162	Elec Maint. Shop		•	•	•		•		•		•	l.	ļ.
T 163	Officers Quarters Military		•	•	•	•	•		•	•	•		
T 164	Admin General Purpose		•	•	•			•	•		-		
T 165	Admin General Purpose			•	•	•	·	•	•		•	·	
T 166	Officers Quarters Military		•	•	•	•		•	•		•		
167	Officers Quarters Military		•	•	•	•	•	•		•	•	·	
S 168	General Purp Warehouse		•	•	•	•	•	•		•			ľ
T 172	Cold Storage Warehouse		•	•	•	•	•	•	•	•		Ŀ	l'
P 177	Technical Library		•	•	•	•	•	•	•	•	•	•	
P 178	Child Development Cntr		•	•	•		•	•	•	•	•	·	
S 182	Commissary		•	•	•	•	•		•		•	l'	_
S 186	Sup Svc Admin Bldg		•	•	•	•	•	•	•	•	1	_	Ľ
P 190	Post Chapel		•	•	•	•	•	•			٠	_	'
S 197	Admin Bidg R&D - Office		•	5.7	•	•	\$44.87	•	\$635	\$541	\$603	13.44	1.05
	Admin Bidg R&D - Electronics						-						
S 198	General Inst Bidg		•	=		•	\$8.33	•	\$118	\$541	£09 \$	72.37	0.20
P 205	Admin General Purpose		•		28.2	•		\$140.25	\$1,933	\$585	\$643	4.83	2.98
P 206	Enlisted Pers Dining Fac	_	1	•	818		•	\$407.38	\$5 61A	41 161	\$4 200	9 40	7 00
}	Kitchen Area - Scullery				? .		ı	2) 2 3 4	<u> </u>	067'		÷.55
P 207				•	28.3	•	•	\$140.90	\$1,942	\$582	\$649	4.61	2.99
P 207A	Company HQ Building#	4			.:			12 × 4	- - - -	 	ma-		
8 8	P 208 Eni Barracks W/o Dining P 208A Company HQ Building	Ī		*	28.0			\$139.49	\$1,922 •	\$582	\$649	4.65	2.96
*											_	 .	
		-		1									

Fac		ECO	ECO	B10 Energy Savings:	ings: Auto	Automatic Flue Damners	Dampare						
ŝ	Installation Name	B10	Flectric	Property	Lio los in	Flooding			1			Г	
		2	KWH/Yr	7	_2	\$77r	SAT	10 ×	Saved Saved	Constr	Investment Payback		SIR
P 209	AAFES Snack Bar	-	•	2.0	•	•	\$15.97		\$228	\$544	\$600	27 70	200
P 210	Hith/Dntl Clinic w/ Beds	-	•		21.5			\$10604	\$1.474	€EB2	2000	07.70	0.37
P 211	Outdoor Swimming Pool	-	•	27.2	•		\$214.2R		\$3 034	AEGB	6699	000	6.61
P 212	Gymnasium	-	•	18.5	•		\$120 R3		100 F	\$5.44	200	8.3	9.0
P 219	Physical Fitness Center		•	9.4	ŀ		£74.18		0001	200	200	0	3.03
P 229	۱_	-	ľ	•	28.4			10000	0001	0000	2003	d V	92
P 229A				•	.07	•		\$139.8/	126'1\$	292	\$649	4 .	2.97
P 230		-			28.4			\$14135	94 049	¢rov	4640	3	8
P 230A		-	<u>.</u>					2	5	7000	n+0+	4. U.	9.6 M.
S 235	Admin General Purpose			•	•	•							
\$ 236	Admin General Purpose	L	•	·	•	1							
\$ 237	Admin General Purpose			[ŀ	1							•
S 238	Sig Photo Lab	E	•	10.8		ľ	CBE 17		986			' '	
1.	Process	-						•	007	2	7600	6 6 6	75. 75.
P 240	Admin General Purpose		•			ľ							
\$ 241	GM Facility	-	•	76			13 600				•	•	-
:-			1) -		•	\$50.54 1	•	22	454	\$603	22.73	0.62 0.
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S 243	Admin General Purpose	L	•		•	ľ		1			1		
8 244			•	•	•	•			•				
3 246	Admin General Purpose		·	•	·	•	•		•	ľ			
8 247	Admin General Purpose		•	•	•	•				1			
P 252	Vehicle Maint Shop DS	-	•		18.5		•	\$00.11	280	¢EB2	- CEAO	. 196	. 8
P 256	Vehicle Maint Shop ORG	F	•	•	69	•		71 175	\$5.67	\$578	\$013	4 6	8.6
P 259	Vehicle Maint Shop ORG	F	•	•	20.1	•		\$100 11	\$1.370	CERO C	SEAO.	0,0	8 6
S 283	FE Maintenance Shop		•		•	•	·		1			•	
\$ 286	Admin General Purpose		1	1	1.	ľ							
P 287	Recreation Building	E		3.0			\$22.74		- 600a	. CE44			
S 288	General Purpose Warehouse		•					'	3	5	200	4.02	0.30
S 290	Electron Equip Facility 16 19 18		•	17.4		•	\$137.19	·	\$1,943	\$568	\$633	4.62	3.07
\$ 291	Cont Humid Warehouse	-		6					- 1				
P 295	Eni Barracks w/o Dining	-		25.5	1		\$74.00		27,048	8000	\$633	8.55	98
P 301	ADP Ruilding	•					4500.1	•	34,042	800	2003	3.16	4.49
		,	•	ò	•	•	\$5.58	•	\$ 29	\$5 4 1	\$603	108.15	0.13
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		1		1.27 1.77			٠. :						

ECO B10 Showt 50f8

Fac		ECO ECO	ECO B10	Energy Sav	B10 Energy Savings: Automatic Flue Dampers	matic Flue	Dampers						
Š	Installation Name	B10	Electric	Propane	Electric Propane Fuel Oil Electric Propane	Electric	Propane	Fuel Oil	\$007	Constr	Investment Payback SIR	Payback	SIR
		Incl	kWH/Yr	MII BTUM	KWH/Yr MII BTU/Y MII BTU/Y	\$/Yr	\$7	\$/X		Cost		Years	
P 642	P 642 Detached Latrine/Shower		•	•	•	•	•	•	•	•	•		٠
\$ 2201	S 2201 Control Tower - Range SPT		•	•	•		٠	•	·	•	٠	•	•
Fotals			0	174.3	282.8	0\$	\$1,372	\$1,372 \$1,408 \$38,830	\$38,830	\$13,059	14,560.8	5.24	2.67
	-	Total	Totals are for bu	ildongs wit	for buildongs with SIR's > 1.0 ONLY	1.0 ONLY							
		-	4.4	-e									

CONSTRUCTION COST EST	ГІМАТ	Έ		Pebruary	1993	Sheet 6	8
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for		
Fort Hunter-Liggett, California					Code A	(no design compe	rted)
Keller & Gannon					ļ		
Drawing No.		Estimato	or .		Checked	Ву	
ECO-B10 Install Automatic Flue Damp	ers on	RJB			BIH		
Line Item	No.	antity Unit	La Per	bor	Per	faterial	Total
Line part	Units	Meas.	Unit	Total	Unit	Total	Cost
OIL FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$156	\$156	\$188
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Oil Fired							\$368
Sales Tax 8%							\$29
Contractor O.H. & P 30%							\$29
Sub Total							\$426
Bond 1%							\$4
Sub Total							\$431
Estimating Contingency 10%							\$43
Total Probable Construction Cost							\$474
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$161	\$161	\$196
Relay & Wiring	-	Job	•	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Oil Fired							\$376
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$113
Sub Total							\$519
Bond 1%							\$5
Sub Total							\$524
Estimating Contingency 10%						-	\$52
Total Probable Construction Cost							\$576
							40.0
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$161	\$161	\$199
Relay & Wiring		Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Oil Fired				,		777	\$379
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$114
Sub Total							\$524
Bond 1%							\$5
Sub Total							\$529
Estimating Contingency 10%		$\neg \uparrow$					\$53
Total Probable Construction Cost							\$582

				Date Prepared		Sheet	OF
CONSTRUCTION COST ES	TAMITE	E		February	1993	7	8
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for		
Location					Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon		Estimato			Checked	B.,	
Drawing No.	nore on		ж		BIH	Бу	
ECO-B10 Install Automatic Flue Dam		antity		abor		daterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
GAS FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$134	\$134	\$166
Relay & Wiring		Job		\$120	<u> </u>	\$60	\$180
Subtotal 4-inch Flue, Gas Fired							\$346
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$104
Sub Total							\$478
Bond 1%							\$5
Sub Total							\$483
Estimating Contingency 10%						<u> </u>	\$48
Total Probable Construction Cost	•						\$531
					<u> </u>	<u> </u>	
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$138	\$138	\$173
Relay & Wiring	-	Job	•	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Gas Fired							\$353
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$106
Sub Total							\$487
Bond 1%							\$5
Sub Total							\$492
Estimating Contingency 10%							\$49
Total Probable Construction Cost							\$541
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$152	\$152	\$190
Relay & Wiring	-	Job	-	\$120	- T	\$60	\$180
Subtotal 8-inch Flue, Gas Fired							\$370
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$111
Sub Total							\$511
Bond 1%							\$5
Sub Total	1						\$516
Estimating Contingency 10%							\$52
Total Probable Construction Cost					i		\$568
IVENDIU GUIDINANIALI GAAL				L		<u> </u>	7000

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Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 8 of 8

ECO B10

Location: Project Title Discrete Po		ggett, California Dampers on HVAC I	Region No. 4 -IW Boilers		Project No. 1 Fiscal Year		
	te: March 1993		Economic Life:	15 YEARS	Preparer: KEL	LER & GAN	INON
1. Investme	at Coete						
A. Construc			\$13,059				
B. SIOH			\$718	-			
C. Design C	ost		\$784				
D. Total Cos	t (1A+1B+1C)		\$14,561				
E. Salvage \	alue of Existing E	Equipment		\$0 3			
F. Public Uti	lity Company Reb	ate		\$0 ±	_		
G. LOTAL INVE	estment (1D-1E-1F	-)			\$14,561		
2. Energy Sa	avings (+)/Cost(-)	:					
Date of NIST	TR 85-3273-X Use	d for Discount Factor	S				
Energy	Cost	Saving	Annual \$	Discount	Discounted		
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)		
A. Elec.	\$21.84	0.0	\$0.æ	11.70	\$ 0.=:		
B. Dist	\$4.98	282.2	\$1,405	13.78	\$19,366		
C. Propane	\$7.87	174.3	\$1,372	14.16	\$19,424		
D. Demand	\$108.60	0.0	kw \$0.2	11.70	\$0.E		
E. Other F. Total							
1. TOTAL			\$2,777		\$38,790	•	
3. Non Energ	y Savings (+) or	Cost (-):		_			
A. Annual Re	curring (+/-)		\$0:#⊏				
(1) Discount I	Factor (Table A)			11.12			
(2) Discounts	d Savings/Cost (3	3A x 3A1)			\$0.₹		
B. Non Recur	Ting Savings (+)	or Cost (-)					
Item.~	Savings(+)	Year of	Discount ~	Doscounted Sav-	<u>.</u>	مديران أرتعي	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)			
a. •	• •				- 7		· # * # *
b. ⊈ .							
C. ≕							4
d. Total -				· • • • • • • • • • • • • • • • • • • •	•	المجيدين	- : **
C Total Non E	nergy Discounted	i Savings (3A2+3Bd4		\$0 <u>₹</u>		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
I. Simple Dev	hadr 16/ME3 : 04	\+(3Bd1/Economic Li	£-1).				
5. Total Net D	iscounted Saving	`+(>641/60000MCLI • (>641/60000MCLI	10)):		Years	2 21 1]	
6. Savings to	investment Ratio	(SIR) 5/1G:	-	\$38,790 == 2.66 ==			uh≠
	ternal Rate of Ret			2.66 ⊱			

Keller & Gannon

COMPUTED BY RUTS	ECO# B-11	PROJECT 16.403-10
CHECKED BY 1913	ECOHOMIZER	
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162	209		
162	209		
162 177 * 178	209 240 241 ¥		
162 177 * 178	209 240 241 *		

Keller & Gannon

Engineers-Architects

COMPUTED BY ZUB CHECKED BY BIH DATE 1913	ECOHOMIZER	PROJECT 16-403-10 THE FETTP
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	CISE, SAME AS BLOG THE EXTERIOR OF ROOMIS REHETRAT AND IS TRUTED TO MULTIFOHE UHIT TO UHICOHPITIONED OUT ALL ZONES REQUIT	THE MECHATHICATE ETS ATHO OUTSIDE STAR CENTRAL OTRONDE 1000 AS SIDE, TIR LITERAL
	CISE, SAME AS BLOG THE EXTERIOR OF ROOMIS REHETRAT AND IS TRUTED TO MULTIFOHE UHIT TO UHICOHPITIONED OUT ALL ZONES REQUIT	THE MECHATHICATE ETS ATHO OCITSADE STREET CENTRAL STREET LITERAL SECOLITS ATTO STREET COLITS ATTO

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Keller & Gannon

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DATE 753 1913	FRICE GOD ASSUMPTIONS	SHEET NO. 3 OF 16 SHEETS
BUILDING	TESSIPITON OF M	IOTEL
290	THE EXTERIOR OF	THE MECHANICAL
	ROOM IS PEHETRA	
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	AND TEMPERATURE	
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Keller & Gannon

COMPUTED BY PUTS CHECKED BY BHT CHECKED BY BHT	PROJECT 16-403-10
DATE FEB 1973 ECOLOMIZER REV. 19 ALIGNAL OTM TRANSHIR &	SHEET NO. 4 OF 16 SHEETS
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\$60.78/HZ x ZHZ/BLOG x 14 BLOGS	
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\$1106/316 x 11. C = \$11,000	
+ 1993 MEANS COST FOR LORKERS BY	12-12-14-63-11-1
LY UPIL FACTOR FROM TABLE A	
HETIR 85-3273-X e 4 % 15	
15 YE ESCALATION.	

ECO BIL Sheet 50 f 16

ECO: RETROFIT ECONOMIZERS ON EXISTING COOLING SYSTEMS

ENERGY SAVING CALCULATIONS FOR NON-TRACE 600 BUILDINGS

Cooling energy is saved by an economizer system by rejecting Return Air which is at a higher energy level (enthalpy) than the outside air. The outside air is conditioned and supplied to the space in place of the higher energy return air.

For the purposes of these calculations, dry bulb temperature is used to discriminate between outside air and return air. An economizer is assumed engaged whenever the outside air temperature is lower than that of the return air.

Most conditioned spaces are not authorized cooling when outside temperatures are below 78 Degrees F. (Fort Ord Regulation 11-2) However, systems are normally operated to provide space temperatures in the range of 72 to 75 Degrees F even though the minimum cooling temperature setpoint authorized is 78 Degrees F.

Since energy savings for an economizer occur when return air temperature exceeds outside air temperature, only buildings which require cooling during normally non-authorized periods are applicable to this ECO.

Assume return air temperature is 72 Degrees F. Assume supply air temperature is 55 Degrees F. Assume 1.5 CFM per floor SF air supply. Assume 25% OA is introduced into the space.

Eco BII Sheet 6 of 16 :

2.3

86.5 6.2 83.5

69.7 68.0

71.5

				_										
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8	3	38.4	43.2	147	60	51.7	40	12		8 8	3 2	107	į	9
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ة ,	ī	42.5	8	6 67	188	57.2	70.6	75.8		2 4	9	47.9		,
8	3	19	51.1	53.1	60.5	80.6	76.0	80.3	8		4	1.0	45.8	
-	2	0.00	54.7	56.8	89	65.7	81.2	85.7	83.0	75.8	89	20	48.7	•
60	2	P.	58.3	61.6	72.1	70.7	86.4	91.2	87.9	80.3	74.4	59.6	6.	2
17		0 0 0	61.3	65.7	78.1	74.1	90.9	85.8	2	7	78.4	83.8	20	!
16	5	3	63.2	87.8	78.7	76.2	93.7	28.7	7	86.9	80.9	65.8	55.6	
5	9	<u>P.</u>	2 .0	68.6	79.8	77.2	9.9	100.0	86 87	88.0	82.0	199	56.3	
7	~0	3	63.2	87.8	78.7	76.2	93.7	98.7	7.	86.9	608	85.8	55.6	
5	88	3	61.0	65.5	75.7	73.8	90.5	95.4	91.7	20.0	78.0	63.5	53.8	
5	5		27.7	60.3	71.3	70.1	85.6	80.3	87.1	79.6	73.6	59.0	51.1	
Ξ	8.8		53.3	55.4	2.	2	79.2	83.6	21.1	73.7	89.8	53.4	47.6	
5	43.1		48.7	50.5	57.2	67.9	72.4	76.5	74.6	86.5	8.6	48.5	43.6	
6	38.1		4 .0	46.2	51.7	53.2	62.9	69.2	4.89	0.0	4 .2	1.	40,4	
•	* 8		2 0	45.4	46.9	49.2	58.5	62.7	- 0; 60;	58.2	49.4	40.3	37.5	
7	30.7	اپ.	60 60 60 60 60 60 60 60 60 60 60 60 60 6	39.8	43.6	4.6	55.6	6.9	58.5	6.19	19	37.7	35.5	
60	8	-	37.5	38.4	41.7	4.0	53.6	86.8	999	5.	4 .3	36.3	7.	
ю:	% 90 7.	#1 #1 	8	37.8	41.0	1	82.8	56.0	98.0	49.3	43.6	36.7	8.0	•
4	28.7	- S	8	88	4.4	4.0	53.2	56.4	88.3	49.7	0.4	36.0	4 .2	
6	28.7	N N	27.7	38.0	42.5	45.5	7	27.7	47.4	50.8	4 6.1	80.9	3	 -
α ·	9		90.0	4 0.1	43.9	48.7	88.0	4.6	8	62.8	46.5	38.0	36.7	
											46.3			
MONTH/HOUR	Jeruary	Coherent	, and the last	March	April	May	h	July	August	September	Ootober 1	November	December	••

Annual Hourly Temperatures, Averages per Month:

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> 67.6 70.4

Moved Air Telling Statistics Eritering Coli; Minimum 55 Degrees F. Coli leaving air terms with the colin state of the color and																														ار	7
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egrees F, coll leaving air temp 61.9 65.0 65.0 65.0 65.0 61.9 61.9 65.0 65.0 65.0 65.0 65.0 61.9 61.9 65.0 65.0 65.0 65.0 65.0 65.0 64.0 61.9 65.0 65.0 65.0 65.0 65.0 65.0 65.0 66.0 66.0 65.0 65.0 65.4 71.3 72.9 73.7 74.0 65.0 67.2 64.1 70.1 72.9 77.7 74.0 65.0 67.1 76.2 77.4 76.0 77.7 76.0 66.0 66.5 72.4 73.8 77.7 78.0 66.3 66.0 66.5 77.4 73.5 77.7 78.0 66.3 66.0 66.5 66.0 65.0 65.0 65.0 65.0 66.1 66.0 65.0 65.0 65.0 65.0 65.0 65.0<			50	5	5.7		5 E	78.7	, a	3 9		2	73.6	83.8	65.0			2	Ş			5 5	}	ž :	=	683	803	211	4	388	
egrees F, coil leaving air temp 65.0 65.0 65.0 is 65.0 is 65.2 is 65.8 65.0 65.0 65.0 is 65.0 is 65.2 is 65.8 65.0 65.0 65.0 is 65.0 is 65.2 is 67.8 65.0 65.0 65.0 is 65.0 is 65.0 is 67.8 65.0 65.0 65.0 is 65.0 is 65.0 is 67.8 67.2 is 73.1 65.0 67.2 is 74.3 is 75.8 is 77.3 is 75.1 77.4 is			609	830	67.8	2 2 2			787	; ;	 78.7		74.2	82.8	92.6			1	717	: 3	ţ §	3 5	} &	2 2	ह	28	22	296	2	8	
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₩ .		F,	55.0	55.0	55.0	57.2	67.9	12.1	73.1	72.7	56.5	4		020	0220		ERAI	77	313	980	88	818	513	3	¥ ;	\$	4 69	<u> </u>	334	908	
₩ .		grees	65.0	55.0	65.0	55.0	65.0	63.9	59.2	4.88	90.0	5					EMP	- 8	284	327	358	381	\$	Ş	} {	8	8	389	301	2	-
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		Mixed A	Jenuary	February	March	April	May	es,	July	August	September	Ootober	Mentambar		Necember	NO ECO	COOLIN	January "	February	March	April	May	Jen	July	Aires		September	Jecopor	November	December	

ECONOMIZER ON

ECO BIL Sheet 805-16.

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MIZI	-												
ECONOMIZER ON COOLING DÉGRÉE HOURS FI	January	February	March	April	Mary	Ę	Şīğ.	August	September	October	November	December	

TOTAL COOLING DEGREE HOURS PER YEAR:
NO'ECONOMIZER: NO PER THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF T

ECONOMIZER ON:

COMPRESSOR/CONDENSER ENERGY

IGY ****

ECO BII Skeet 9 of 16.

file B11-HAND.WQ1 USE RESULTS ONLY FOR HAND-CALC BLDGS

BUILDING	COMPRESSO	CONDENSE	ECO B6/7	SAVINGS	ENERGY COST	•
NO.	kWH/Yr	kWH/Yr	Savings	kWH/Yr	SAVED/YEAR	
120	6,234	included	0	3,260	\$220	
121	11,475	1,511	186	~ 6, 694	\$453	TRACE 600
161	4,470	Included	2,006	1,289	\$87	
162 4	4,470	0	2,006	1,289	\$87	
163#	4,470	0	2,006	1,289	\$87	-
164 #	4,470	0	2,006	1,289	\$87	
165 🕊	4,470	0	2,006	1,289	\$87-	
166 ◀	4,470	0	2,006	1,289	\$87	
167 🗸	4,470	0	2,006	1,289	\$87	
177	12,779	1,193	3,526	5,463	\$369	TRACE 600
178 -	15,974	1,491	5,588	- 6,211	\$420	
186	7,546	included	3,197	2,274	\$154	
190 ◀	34,548	Included	0	- 18, 067	\$1,221	
197	12,691	Included	0	6,637	\$449	
209	43,780	2,090	11,449	18,001	\$1,217	
240	8,936	728	. 0	5,054	\$342	
241	16,565	2,186	0	- 9,806	\$663	TRACE 60
290	12,581	1,554	9,292		\$171	TRACE 60
291	7,727	738 .	5,142	1,738	\$117	TRACE 60

+ nic on Collowing sommany unalysis, but are included in LC analysis sheet.

ECOBIL Sheet 10 of 16

					•											
SIR		0.237	0.768	(0.089)	(0.089)	0.748	0.593	0.383	0.766	9260	0.519	0.777	(0.130)	(0.647)	0.639	
Payback	Years	181.8	14.4	(350.0)	(350.0)	16.1	33.4	82.6	14.5	3.8	45.7	13.6	(281.2)	(105.5)	27.4	
Savings	FCC &	\$611	\$4.067	(\$91)	(\$91)	\$3.232	\$2,913	689\$	\$4.022	\$13.179	\$2.074	\$6.030	(\$260)	(\$883)	\$35,486	
Savings	Total \$/Yr	\$43	\$342	(\$13)	(\$13)	\$271	\$240	\$54	\$338	\$1.122	\$169	\$508	(\$32)	(\$86)	\$2,944	
Energy	\$CC\$	\$2,578	\$5,294	\$1,019	\$1,019	\$4,321	\$4,913	\$1,799	\$5,249	\$14,237	\$3,997	\$7,756	\$2,003	\$1,374	\$55,561	
Energy	Svg/Yr	\$220	\$453	\$87	\$87	\$369	\$420	\$154	\$449	\$1,217	\$342	\$663	\$171	\$117	\$4,749	
O&M	CCC &	(\$1,968)	(\$1,227)	(\$1,110)	(\$1,110)	(\$1,088)	(\$2,000)	(\$1,110)	(\$1,227)	(\$1,058)	(\$1,923)	(\$1,726)	(\$2,263)	(\$2,263)	(\$20,074)	
O&M/YR	Saved	(\$177)	(\$110)	(\$100)	(\$100)	(86\$)	(\$180)	(\$100)	(\$110)	(\$6\$)	(\$173)	(\$155)	(\$204)	(\$204)	(\$1,805)	
Investment	Total	\$7,893	\$4,922	\$4,452	\$4,452	\$4,365	\$8,021	\$4,452	\$4,922	\$4,244	\$7,713	\$6,922	\$9,077	\$9,077	\$80,514	
Construction	Total	\$7,079	\$4,414	\$3,993	\$3,993	\$3,915	\$7,194	\$3,993	\$4,414	\$3,806	\$6,918	\$6,208	\$8,141	\$8,141	\$72,210	
	Subtotal	\$4,538	\$2,830	\$2,560	\$2,560	\$2,510	\$4,612	\$2,560	\$2,830	\$2,440	\$4,435	\$3,980	\$5,219	\$5,219	\$46,293	
Building	Š	120	121	161	162	177	178	186	197	5 08	240	241	88	291	Totals	

Construction Cost....Installed Cost

O&M/YR.......Yearly maintenance scheduled as 2.5% of installed cost per year

OH & P......Contractors overhead and profit 30%

Bond.....1%

SIOH & Design Costs #14% (14) SIOH = 5.5 %; Design 6.0% of Construction Cost Contingency......Estimators contingency 10%

SIR.....Savings/(Cost+Maint+UPW)

Note: Minor differences between this summary and other tabular calculations are due to rounding errors.

- 1970年 - 19

				Date Prepared		Sheet C)F
CONSTRUCTION COST E	ESTIMAT	Ε		February	1993	11	16
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10			
Location					Code A	(no design compe	rted)
Fort Hunter-Liggett, California					1		
Engineer-Architect							
Keller & Gannon		Estimato	W .		Checked	Ву	
Drawing No. ECO-B11 (Economizer)		RJB			він		
ECO-BTT (ECONOMIZE)	Qu	antity		bor	<u> </u>	Material	T-4-1
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total····· Cost
Bidg 120					100	1 2/20	4050
Barrometric Relief Damper	2	ea	\$34	\$67	\$96	\$192	\$259
Opposed Blade Dampers	4	ea	\$61	\$242	\$205	\$820	\$1,062
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909
Controls	2	ea	\$90	\$180	\$316	\$632	\$812
Ductwork (Insulated 1")	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Subtotal (Bidg 120)							\$4,538
Bldg 121							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	20	МН	40.1	\$802			\$802
Subtotal (Bldg 121)							\$2,830
Bldg 161							
Barrometric Relief Damper	1	еа	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	Ibs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Penetrate Building	1	ea	\$50	\$50			\$50
Subtotal (Bidg 161)							\$2,560
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Sub Total (Sheet)		ļ			-		\$9,928
					 	 	
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CONSTRUCTION COST E	STIMA	ΓΕ		Pebruary	1993	Sheet	OF 16
Project				Project No.		Estimate	76
EEAP Limited Energy Study				16-403-10	d and a	\	
Fort Hunter-Liggett, California					Code	\ (no design com	(peted)
Engineer-Architect Keller & Gannon							
Drawing No.		Estima	tor		Checked	Ву	
ECO-B11 (Economizer)		RJB			він		
		ientity	1	bor		Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Bldg 162						•	
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Penetrate Building	1	ea	\$50	\$50	1		\$50
Subtotal (Bldg 162)		1					\$2,560
BLDG 163,164	1,165,	166,	167 ad	ded to	LCCI	Sheet.	
Bidg 178							
Barrometric Relief Damper	2	ea	\$34	\$67	\$96	\$192	\$259
Opposed Blade Dampers	4	ea	\$61	\$242	\$205	\$820	\$1,062
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909
Controls	2	ea	\$90	\$180	\$316	\$632	\$812
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bldg 178)							\$4,612
							,
Bldg 241							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
ouvers	2	ea	\$34	\$68	\$58	\$116	\$184
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	100	ibs	\$6	\$579	\$4	\$436	\$1,015
Penetrate Bldg	2	ea	\$50	\$100		\$0	\$100
Retrofit Existing Components		МН	40.1	\$962			\$962
Subtotal (Bldg 241)							\$3,980
Sub Total (Sheet)							\$11,151

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				Date Prepared		Sheet	OF
CONSTRUCTION COST ESTIMATE				February	1993	13	16
				Project No.	Basis for		76
Project EEAD Limited Energy Study				16-403-10			
EEAP Limited Energy Study					Code A	(no design com	peted)
Fort Hunter-Liggett, California							
Engineer-Architect							
. Keller & Gannon		Estimate			Checked	Av	
Drawing No.		RJB			ВІН	-,	
ECO-B11 (Economizer)	Qu	antity		bor		Aaterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Bldg 177							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481	<u> </u>		\$481
Subtotal (Bldg 177)							\$2,510
Bldg 186							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Penetrate Building	1	ea	\$50	\$50			\$50
Subtotal (Bldg 186)							\$2,560
				Same	cost	as 190	<u> </u>
_							
Sub Total (Sheet)							\$5,069

				Date Prepared		Sheet	OF
CONSTRUCTION COST ESTIMATE				February	1993	14	16
Project				Project No.	Basis for		
EEAP Limited Energy Study				16-403-10			
Location					Code A	(no design comp	eted)
Fort Hunter-Liggett, California					1		
Engineer-Architect							
Keller & Gannon Drawing No.	· · · · · · · · · · · · · · · · · · ·	Estimato	er e		Checked	Ву	
ECO-B11 (Economizer)		RJB			ВІН		
		antity		abor		Anterial	7-4-1
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Bldg 197							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	20	МН	40.1	\$802			\$802
Subtotal (Bidg 197)							\$2,830
Bldg 209							
Barrometric Relief Damper	11	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$56	\$111	\$175	\$350	\$461
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1*)	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Subtotal (Bldg 209)							\$2,440
(3.13)							<u> </u>
Bldg 240							
Opposed Blade Dampers	4	ea	\$56	\$222	\$175	\$700	\$922
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909
Controls	1	ea	\$145	\$145	\$482	\$482	\$627
Ductwork (insulated 1")	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components		МН	40.1	\$962			\$962
Subtotal (Bldg 240)							\$4,435
Sub Total (Sheet)						i	\$9,705

				Date Prepared		Sheet	OF
CONSTRUCTION COST ESTIMATE				February	1993	15	16
Project				Project No. Basis for Estimate			
EEAP Limited Energy Study				16-403-10			
Location				,	Code A	(no design com	peted)
Fort Hunter-Liggett, California					1		
Engineer-Architect					1		
Keller & Gannon Drawing No.		Estimat	Of .		Checked	Ву	
ECO-B11 (Economizer)		RJB			він	•	
		antity		bor	1	Actorial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total - Coet
Bldg 290							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
Louvers	2	ea	\$45	\$90	\$75	\$150	\$240
Controls	1	ea	\$145	\$145	\$482	\$482	\$627
Ductwork (insulated 1")	100	Ibs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bidg 290)							\$5,219
Bldg 291							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
Louvers	2	ea	\$45	\$90	\$75	\$150	\$240
Controls	1	ea	\$145	\$145	\$482	\$482	\$627
Ductwork (Insulated 1*)	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bldg 191)							\$5,219
Sub Total (Sheet)							\$10,438
Sub Total (ECO B-11)							\$46,292
Sales Tax 8%				2			\$3,703
Sub Total							\$49,995
Contractor O.H. & P 30%							\$14,999
Sub Total							\$64,994
Bond 1%							\$650
Sub Total				i			\$65,643
Estimating Contingency 10%							\$6,564
Sub Total							\$72,208
Total Probable Construction Cost							-000,000
					1		

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Life Cycle Cost Analysis Summary ECO B11 Energy Conservation Investment Program (ECIP) Sheet 16 to 16

Location:	Fort Hunter Lig Retrofit Econom	gett, California	Region No. 4			Project No.	
	neront Economic tion Name: ECO					Fiscal Year	FY96 -
	e: March 1993	r 0- 11	Economic Life:	15	YEARS	Properor VS	ELLER & GANNON
, a karyona Bac	6. Waa (1730		LOOKOTHIC LITE.	13	ILANO	Lieberei. Vo	ELLER & GANNON
1. Investmen	t Costs						
A. Construct	ion Costs		\$96,168				
B. SIOH			\$5,289	-			
C. Design Co			\$5,770	_			
D. Total Cost	(1A+1B+1C)		\$107,227				
E. Salvage V	alue of Existing E	quipment			\$0 :		
	ity Company Reb				\$0	_	
G. Total Inve	stment (1D-1E-1F	7)				\$107,22	27
2. Energy Sa	vings (+)/Cost(-)	:					
Date of NIST	IR 85-3273-X Use	d for Discount Facto	rs	-			
Energy	Cost	Saving	Annual \$		Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$19.81	323.4	\$6,407		11.70	\$74,959	
B. Dist	\$4.98	0.0	\$0 %	-	13.78	\$0.2	
C. Propane	\$7.87	0.0	\$ 0. ፰	-	14.16	\$0.≅	
D. Demand	\$108.60	0.0	k \$0.∓	-	11.70	\$0 =	
E. Other			-	_		45 -	
F. Total			\$6,407			\$74,959	
	• • • • •						
3. Non Energ	y Savings (+) or	Cost (-):					
A. Annual Red	curring (+/-)		\$0 ⊋				
	actor (Table A)			• ·	11.12		•
	d Savings/Cost (3A x 3A1)		_		 \$0 ⊋	5, a. 2.2
		•				•••	مارچ الارسان مارچ الارسان الارسان الارسان الارسان الارسان الارسان الارسان الارسان الارسان الارسان الارسان الارسان
B. Non Recur	ring Savings (+)	or Cost (-)					
lann.	0		A	_			
Item ·	Savings(+)	Year of	Discount		oscounted Sav-	••.	
	Cost(-)(1)	Occur. (2)	Factor(3)	17	ngs(+)Cost(-)(4)		and the second second
A .							
_ b. <i>≍</i> .			•	_		-	e Paulini
C			· ·	_			The state of the s
d. Total		-		-		-	
C Total Non E	nergy Discounted	d Savings (3A2+3Bd	 4		\$0`≆		
					+- -		
I. Simple Payl	back 1G/(2F3+3/	A+(3Bd1/Economic	Life)):		16.7	Years	
5. Total Net Di	scounted Saving	s (2F5+3C):			\$74,959		
	nvestment Ratio				0.70		
7. Adjusted Int	ternal Rate of Ret	um (AIRR):			Negative		,
					_		

Keller & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO B/2	PROJECT 16-4-03-10
DATE HARCH 1993	INSTALL BOILER OXYGEN	
REV19	TRIH CONTROLS	SHEET NO. 1 OF 3 SHEETS

DESCRIPTION OF ACTION

Install oxygen trim controls on HW and Steam boilers. Energy is saved by improved combustion control; higher system efficiencies are achieved. Depending on load conditions, savings of 1.5% to 3.0% of Cuel use can be achieved.

FACILITIES INCLUDED

Only larger boilers can dost effectively be retrofit with such controls, buildings identified to evaluate include: BARRACHS COMPLEX

BUILDINGS (205, 206, 207, 208, 229 & 230), each

with 1,875,000 Brut firing rate boilers.

FORM 101-1/8

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY BIH	ECO BIR	PROJECT
DATE HARCH 1993		
REV19		SHEET NO. 3 OF 3 SHEETS

SCREENING ANALYSIS

FUEL OIL USE IN BARRACRS BOILER SYSTEMS

ZOS, 206, 207, 208, 229, 230 HAVE 7 IDENTICAL BLRS

TOTAL EXISTING FUEL OIL USE

HVAC 10,820 LIOBENIAR

DHW 3789 ×106 BTD/YR

TOTAL 13,609 ~106 BTD/YR

FUEL OIL COST \$4.98 / BTO
ALLOVAL COST SAVINGS:

ASSUME 1/2 % SAUINGS (LESS SAUINGS ON THESE SHALL BOKERS)

13,609 x0.015 = 204x106 BTU/YR POTENTAL SAUINGS #4,98 x 204 = \$ 1016 /YR -11

LIFE CYCLE SAVINGS, ASSUME 15 YR LIFE

UPW = 13.78 LIFE CYCLE ENERGY COST SAVINGS

#1016 x 13.78 = # 14,009 LIFE CYCLE

COST SAVINGS.

IN 1982 A RETROFIT OZ TRIM CONTROL SYSTEM

COST ABOUT \$ 6600 EACH. TO ACHIEVE
\$14,009 SAUINGS, \$\frac{7}{2} OF THESE CONTROCS

MUST BE INSTACLED FOR A HIMINUM

OF 7x\$6600 = \$46000 IN 1982 DOCLARS.

THE CONCEPT IS NOT ECONOMIC AT
FORT HUNTER-UGGETT BOILER SIZES

Σ	Keller	&	Ganr	ion:

DATE	DBY BH		FEO" B-13		TIT EEW	
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REV.						
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Keller & Gannon

COMPUTED BY	_ Eco B-13	PROJECT
CHECKED BY		
	19	SHEET NO. 2- OF 11_SHEETS
REV1	9	GILLI NOOISILLIO
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453	79.9- KWITTE	
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block Late	S_C_ 95°FD3_ 70°FH3=	12-1,665 PLUH
	AP CORETE FFFICIETY =	750/
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1 HEIL ENE	ewa the Catarons = 95	- 75 (95-70) = 710=
- STILL PINE		
ASSUME CO	OHSTAT MOISTURE CONTEW	150 FRAM
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	ich coil	
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	= 41,288 BILLY	

Keller & Gannon

COMPUTED BY RUB Eco# 313	PROJECT 16-4-3-10 FITE FEAR
CHECKED BY 51H DATE FEB 1993 FUNDENTIVE PRECIMENS	
REV	SHEET NO. 3 OF 11 SHEETS
	27,663
= 19,730.4 KW/72 X .07	1454 /KWH
= +1,470/YR	
= SMILITELY FOR POLIDAS!	
205 2207	
BTUH : 618,719 (FROM BUDG 207 T	
Bruh = 618,719 (0.585) = 349,5	76
Filtren (155 1) 1560 16,7 - 75,112 Kunt	1/12
CAVIVES - 75,112 (613,719-32	19576)
= 32,673 KWH/12 . 0745	4 KWH
- \$ 2,436 / YR	
1 1208) 1 19,250 32673 = 34,473	- KWHYr, Save R
229 5 75,112	A- CEE CM -1-1
230 34,473 x 0.074544/kent	Says 40 / YE SAVES
295 Bruth = 1,123,723	
BILITY : 1,127,723×(0.565) > 6.	37,163
Fullt . 95,825 - / 1/27,723 -	637,163
51VW4S = 93,825 (112172	5
= 40,814 Kult/an x 10	7454 \$ / cmy
= \$3,042/40	

l l					February 1993 SHEET OF		
Project EEAP Limited Energy Study					Basis for Estimate		
Fort Hunter-Liggett, California					Code A (no d	design competed)
Keller & Gannon							
Drawing No.		Estimate	or		Checked By		
ECO-B13 (Indirect Evap. Pre-cooler)		RJB			BIH		
Line Item	No.	untity Unit	Per	bor	Mater Per		Total -
	Units	Meas.	Unit	Total	Unit	Total	Cost
ndirect Evap. Pre-cooler	1	EA	\$2,550	\$2,550	\$850	\$850	\$3,400
Ductwork	25	lbs	\$3	\$70	\$2	\$59	\$129
Concrete Pad	4	CY	\$19	\$76	\$47	\$188	\$264
1/2" Cu Piping (Water & Drain)		Ft	\$3	\$310	\$1	\$128	\$438
Power & Control Wiring	1	Job	\$75	\$75	\$100	\$100	\$175
Subtotal							\$4,406
							
	1						
ψ.							

Keller & Gannon

COMPUTATION SHEET

	COMPUTED BY	_ Edo	3-13	PROJECT	
	DATE			SHEET NO. 5 OF	:/_SHEETS
F		ANALYSES			
ŀ	R/N6 128 *	TOULD BARRAU	U BOOL		
Ē		idual Thru-		on che	CHO
	distr	bution, to	lal = ~60	FCU's.	
1	one	precoder o	ion sorve	zunits,	
	tota	e constr.	Cost 1 \$440	6 x 60 =	\$ 264,36
ŀ		1-1500	4 400000	Line ound	,
	Enex	gy Cost Saus	75, 1190	AZAGZ	
Ī	1	lar fon pe			
	15-	year upo =			
İ		11.7 ×1407	= \$ 16,462		
ŀ	506	S LOT PAY	BACK,		
	Bab 65 205	1207,208,2	29,280		
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	on	previous si	Ceet 8-3,0	048 /year	10 to 10 to
	4.1	e Cycle Saun	953 11.7 43	04Z = \$35;	590
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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY	<u></u>	B=13	PROJECT	
DATE	19			
REV	_ 19		SHEET NO6_ OF	SHEETS
	Air Clows 11	ilo washore	enal van	
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Bldg 293	. There a	re over 1.	20 individe	Las .
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	FCUs in	thes bldg.	1241011	
	costs uson			
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	compared to	- the est	mated -	
	\$ 3042/gr		· , · /	
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FORM 101-1/8

ECO B13 Start 70f11

FAX TO Blain Horst-Keller & Gannon-

Conservation

2561 Westberry Drive

Mechanical

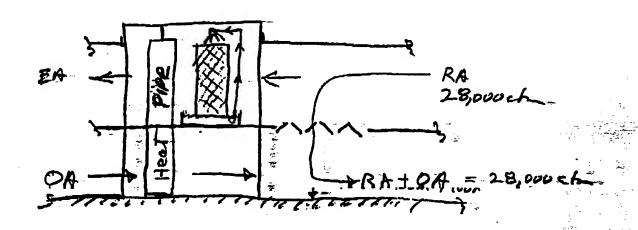
Santa Rosa, CA 95403

Re Fort Hunter Leggett

Systems Inc.

Phone and FAX 707-528-4016

Heat Pipp Dry evap. each Assembly

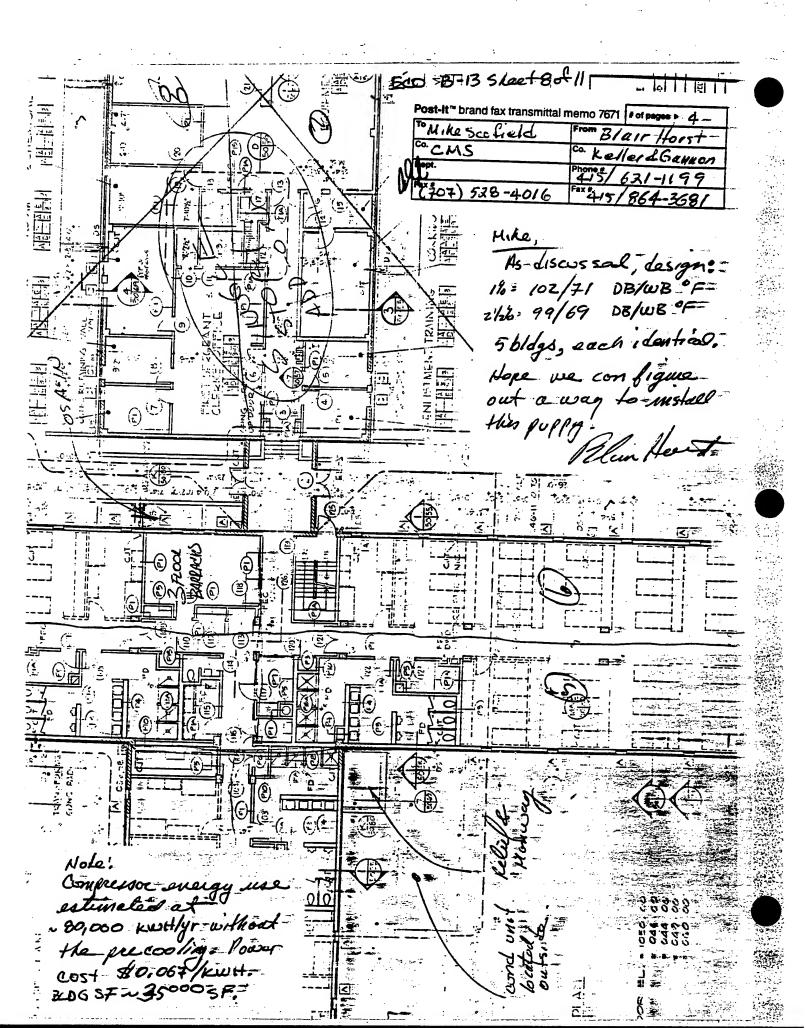


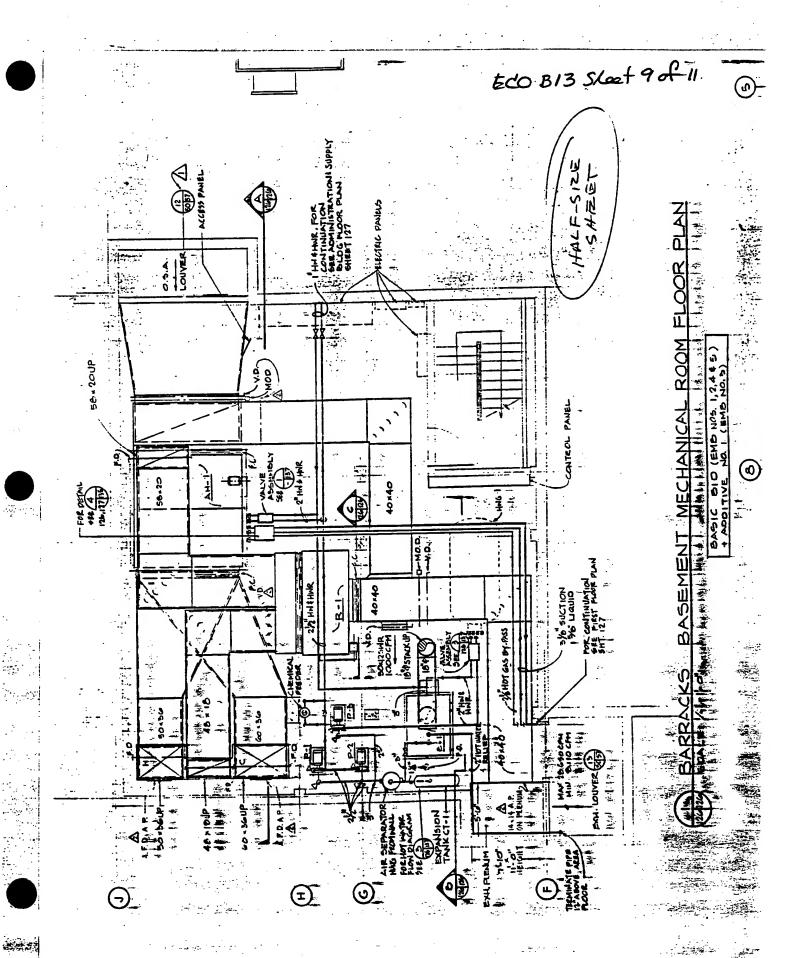
Blair - This is the idea I have inmind. This unit would cool 10-2°F-/77°F

Outdoor Air down to 78°F-DB 63.3°FWA=
entaining your retriggeration DX coils. This is
based on a 63% available indirect evop. cooling
ethiciency (90% Saturation Ethiciency & 70% heat-Proper
ethiciency). No heat pripe maintenance stricks
we are using as wetted median evop. could only
Not spraying the heat enchanger.

SORT

A 45 1 1





ECO B 13 Sheet 10 of 11 SEMENT MECHANICAL ROOM FLOOR PL BASIC BID (EMB 1175, 1,2,4 (S) + ADDITIVE NO 1 (EMB NO. 5) HACE ANTECL PANEL Ee. 20 MOE - 3 & HOT GAS BY . 785 HOT DUCT COLD DUKT · C+101

		500 B-13	
		sheet 110	F11
	vo/rect	EVAPORATUR PRE COOLER	
		RETROFIT	
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		0 // 1	
	· :		
		TYPICAL OF 5	
		3 FLOOR BARRACI	<u> </u>
		BUILDINGS	
SA	EXTS.	FORT HUNTER LA	RETT
	LOUVERS		F
_		B20GS 205,2	0.7=
		208) <u> </u>
		2243	230=
1 /			291
1 / °		<u> </u>	
			رامه شد کونسون در مون
/			200
	e louvers,	INSTALL PREGOCER CELLS.	
KEMOU		LINAC WIDTH)	A STATE OF THE STA
		RS 1/2" SETBACK FROH CONC.	
	am eace		
11' HI 4"D BBI	:		
11' HI 4"D BBI	:	ES/6N 28,650 CFM	
11' HI 4"D BBI	K OSA @D	ES/60 28,650 CFM	
11' HI 4"D BB HA	K OSA Q D PPROX 82F		A-02C
11' HI 4"D BB HA	K OSA @D	ES/60 28,650 CFM	A-pec
11' HI 4"D BBI HA	K OSA Q D PPROX 82F	ES/60 28,650 CFM	A-bec

14

£12,

Keller & Gannon

Engineers-Architects

	TED BY JC	<u>s</u>	ECO # B 14_	PROJECT THE EEAP
HECKE	MARCH	1993	RESET DUAL-DUCT SA	<u> </u>
EV.		19	TEMPERATURES	SHEET NO OF SHEET
	DECER	PTIES!	OF WORK	
	ON BU	ILDING	S WITH DUAL - DUCT S	istems reset
	COOLI	NG_SU	PPLY AIR TEMPERATURE	E LOWER AND
	rese	T HEAT	TING SUPPLY AIR TEM	PERATURE HIGHER
			LOAD TIMES	
	EVALUAT	ION SUM	MARY / APPROACH	
-				
			SYSTEMS ARE ENERGY	
			MON OTHER THAN FULL	
			CONDITIONS THE MIXIN	
			SUPPLY AIR TO VAR	
_	AIR	EMPER	ATURE TO MEET THE	LOAD, SINE
	ONLY	THE M	KEP AIR TEMPERATURE	E CHANGES
	THE	System	MUST HEAT THE SAN	ME QUANTITY OF AIR
	AND	COOL 7	HE SAME AIR QUANTI	TY EVEN AT
	PART	LOAD	CONDITIONS, ONLY TH	IE PROPORTION
	OF I	-10T TO	COLD AIR SUPPLIED	TO THE ROOM
	CHAN	GES	HE TOTAL AM QUAN	VATTY STAYS
		SAME		
_				
	RESE	TTING	THE HOT AND CO	CU VELL PENTACH
			E THE ENERGY RES	
			NGS BUT CONTROLS	
			THAT TELL THE AIR	
			HE TEMPERATURES	
			ONE ZONE: CALLS	FOR FULL
	HEA	TING 0	PR COOLING	
	77 1110	7AF &	YSTEMS LIKE BUILD	ING 351 WHERE
			SENAL ZONES DOMA	
		- INV		
		044-	THAN PHIE TELL NE	TEMULDIAN NE
			LOAD THE COUD DE	CK TEMPERATURE

CONSTRUCTION COST EST	Date Prepared February	1993 Sheet Of					
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate	
Location Fort Hunter-Liggett, California				1	Code A	(no design com	peted)
Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimate	×		Checked	Ву	
ECO-B14 Reset Dual-Duct Temperature		entity		Labor	ļ.,	Asterial	
Line Nam	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
	ļ				ļ		
Install Discriminator Controls to Query					-		\$0
Each Zone to Look for Peak Htg/Clg	1						70
Multi-Channel DDC Controller	1	EA	•	\$2,700	-	\$3,000	\$5,700
includes soft/programming							, .
Temperature Contols for Coils	2	EA	-	\$1,000	\$500	\$1,000	\$2,000
Room Temp. Sensor/Transmitters		EA	-	-	\$610	\$3,660	\$3,660
Conduit/Wiring	150	LF	\$10	\$1,500	\$5	\$750	\$2,250
Testing and Balancing	1	LS	-	\$2,000	-	-	\$2,000
Subtotal							\$15,610
Sales Tax @ 8%							\$1,249
Subtotal							\$16,859
Contractor OH & Profit @ 30%		1,0					\$5,058
Subtotal							\$21,916
Bond @ 1%							\$219
Subtotal							\$22,136
Estimating Contingency @ 10%							\$2,214
Total Probable Construction Cost							\$24,349

. . .

5-17³

	investment		\$24,300	\$24,300	\$24,300	\$24,300	\$24,300	\$121,500
	I	\$ Savings	22,026	\$17,063	\$17,915	\$9,112	\$9,001	\$94,117
	Elec. Ann	\$ Savings	\$3,507	\$940	\$1,531	\$468	\$769	\$7,215
	Prop. Ann.	\$ Savings \$ Savings	•	•	1	292\$		\$257
1.44	FO Am.	\$ Savings	š	\$440	•	•	•	\$440
We reade confident	Electricity	Mill Btu / Yr	192.3	51.6	84.0	25.7	42.2	25.7
rgy Sevings	Properse	Mil Btu / Yr		•	•	32.6		32.6
ECO- B14 Energy Savings Provided	Fuel Oil	MII Btu / Yr	• 1	88	•	•	•	88
ν	Cold Deck	MII BŁÚ/Yŕ	73.5	51.6	45.8	25.7	•	197
ه در دواد ماد عمر	Hot Deck	MII Btű / Yr	118.9	77.3	38.2	26.1	42.2	303
er eilende begannt geben eine er	Supply Fam	* CFM *	6,300	16,600	8,190	5,000	6,280	1991
14 E	Fed	4.4 F	8	208	꿃	287	301	

made that the Hot Deck Temperature would not be reset during Full Load Heating Hours simplification would be reset during Full Load Heating Hours simplified the reset during Full Load Heating Hours and Heating

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

MARCH 1993	RESET DUAL	-DUCT		IL EEAP 13-10
19	SA TEMPERA	rupes	SHEET NO	OFSHEE
ORDER OF IM	PLEMENTATION	/		
			0 P 14401	
THIS ECO.	WAS ASSUMED	NOT 10	E IMIC	
		:		
				

FORM 101-1/8

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Project No. 16-403-10 Location: Fort Hunter Liggett, California Region No. 4 Fiscal Year - FY96 -Project Title: ECO-B14 Reset Dual-Duct Temperatures Discrete Portion Name: Bidgs. 80, 206, 241, 287, & 301 Analysis Date: March 1993 Economic Life: 15 YEARS Preparer: KELLER & GANNON 1. Investment Costs -A. Construction Costs \$121,500 B. SIOH \$6,683 \$0 -C. Design Cost D. Total Cost (1A+1B+1C) \$128,183 E. Salvage Value of Existing Equipment \$0 🌣 F. Public Utility Company Rebate ... **\$**0 🗻 G. Total investment (1D-1E-1F) \$128,183 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Saving Energy Cost. Annual S Discount Discounted \$/MTBU/(1) Source MBTU/YR(2) Savings(3) Factor(4) Savings(5) A. Elec. 396 # \$18.23 \$7,217 11.70 \$84,442 2 B. Dist \$4.98 \$438 88 * 13.78 \$6,039 C. Propane \$7.87 32 \$252 \$3,566 14.16 D. Other NA:-Ô \$0₹ NA= NA E. Demand Savings ... \$0 T 11.70 \$0= F. Total -516 57.907 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) -\$0 = (1) Discount Factor (Table A) 11.12 -(2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Savings(+)--Doitcounted Sav-Coet(-)(1) Occur. (2) 🖀 Factor(3) ings(+)Cost(-)(4) The state of the state of \$03 15 🖘 0.56. SOT \$0.E ······ .15 🛣 0.56.¥ \$0.4 \$0 # 15 🕶 0.56 \$0. d. Total = SO ___ C Total Non Energy Discounted Savings (3A2+3Bd4) 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): 16.2 Years 5. Total Net Discounted Savings (2F5+3C): \$94.047 ~ 6. Savings to Investment Ratio (SIR) 5/1G: ... 0.73

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

Engineers-Architects

COMPUTED BY	ECO#B15	PROJECT FHL EEAP
CHECKED BY	CONVERT MULTIZONE UNITS	
REV. JUNE 1993	TO VARIABLE AIR VOLUME	SHEET NOOFSHEETS

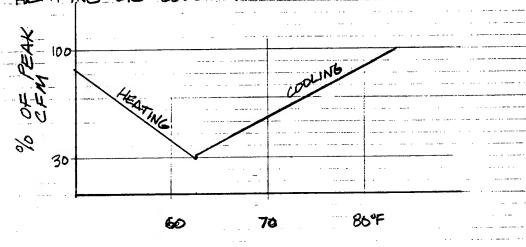
DESCRIPTION OF WORK

REDUCE FAN ENERGY CONFUMED IN BUILDINGS
205, 207, 208, 229 AND 230 BY CONVERTING
CONSTANT AIR VOLUME DUAL-DUCT AIR CONDITIONING
SYSTEMS TO VARIABLE AIR VOLUME SYSTEMS.

EVALUATION SUMMARY / APPROACH

THIS ECO FEATURES THE REMOVAL OF THE DUAL DUCT MIXING BOXES AND CONTROLS AND THEIR REPLACEMENT WITH DUAL - DUCT VAV BOXES.

AS SHOWN BELOW THE VARIABLE AIR VOLUME SYSTEM SAVES FAN ENERGY DURING ALL TIMES DURING THE YEAR EXCEPT THOSE HOURS SPENT AT FULL LOAD HEATING OR COOLING.



THE BARRACKS BUILDINGS WERE ASSUMED TO BE DOMINATED BY EXTERNAL LOADS, THEREFORE THE REQUIRED AIR FLOW WITH TRACK OUTSIDE TEMPERATURE

Keller & Gannon

Engineers-Architects

CKED	ED BY	ks	ECO "B	5 15	PROJECT FAL EEA
	MARCH	1993 CON	IVERT DI	JAL - DUCT UN	16403-10
E	JANE	1993 10	VARIABLE	AIR VOLUME	SHEET NO. 2 OF 5 SH
	THE	following	SCHEDUL	e was der	IVED FIZOM THE
					MATE THE AIR
	MAUS	MTY SUPPL	IED BY T	HE VARIABLI	E AIR VOLUME
	SYST	EM.			
		TEMPERA RANGE		PERCENT TOTAL CFM	PERCENT OF YEAR AT THIS COAD
		······· EANOI		and the second s	
		OVER	80°F	100%	7%
				80%	52%
	w out of the state	50 F 1	0. 309	80%	52/9
		20% T	0.50°F	40%	40%
				<u> </u>	
		BELOW	30°F	100%	1/0
		The second control of the second control of			
			- A A company of the last of t		
	ORDER	OF IMPLE	MENTATI	ON	
	ORDER	OF IMPLE	MENTATI	<u>on</u>	
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	THIS	ELO WAS	S_ASSUME	D TO BE	

ECO - B15 Convert Multizone HVAC System to Variable Air Volume

SIR		1.31	1.26	1.26	1.38	1.14	1.27
l Pay-	Back	8.95 1.31	9.34	9.34	8.49	10.32	9.25 1
Investment	₩	\$27,271	\$27,271	\$27,271	\$27,271	\$27,271	\$136,355
Constr.	Cost \$	\$24,458	\$24,458	\$24,458	\$24,458	\$24,458	\$122,292
t Saved	\$CC\$	(\$2,224)	(\$2,224)	(\$2,224)	(\$2,224)	(\$2,224)	(\$1,000) (\$11,120) \$122,292
Energy Cost Saved O&M Cost Saved	\$/Yr	(\$200)	(\$200)	(\$200)	(\$200)	(\$200)	(\$1,000)
ost Saved	\$CC	\$37,973	\$36,513	\$36,513	\$39,921	\$33,267	253,018 \$15,743 \$184,188
Energy C	\$∕Yr	\$3,246	\$3,121	\$3,121	\$3,412	\$2,843	\$15,743
Savings	kW hr / Yr	52,164	50,158	50,158	54,839	45,699	253,018
Full Load VAV System	kW hr / Yr.	101,260	97,365	97,365	106,453	88,710	491,153
Full Load	kW hr / Yr kW hr / Yr.	153,424	147,523	147,523	161,292	134,410	744,171
SC	RA Fan	23	21	21	23	22	Totals
Fan Amps	SA Fan	55	54	54	29	46	
Fac.	No.	205	207	208	229	230	

Annual Full Load Energy Consumption was calculated from measured phase voltage readings and operating hours of the

Full load kWHr / Year consumption of supply and return fans are reduced to 66% of existing usage due to the proposed VAV retrofit.

Energy cost savings are based on the year-round, continuous usage rate for power.

Annual O&M efforts for VAV system components are expeced to require an additional 5 MH per year of effort. At \$40 per hour, annual cost per building VAV sytem is \$200.

CONSTRUCTION COST EST	Date Prepared February	1993	Sheet Of	5			
Project EEAP Limited Energy Study	Project No.	Basis for E					
Fort Hunter-Liggett, California					Code A	(no design comp	eted)
Engineer-Architect							
Keller & Gannon Drawing No.		Estimate	or		Checked i	Зу	
ECO-B9 VAV Retrofit			すぐ	, >		BIH	
EGG BG V/V House		antity		Labor		laterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 207							
Double-Duct VAV Box with T-stat	8	EA	\$300	\$2,400	\$650	\$5,200	\$7,600
and duct static pressure sensor							
20 HP Variable Frequency Drive	1	LS	-	\$1,200	-	\$3,000	\$4,200
installed w/ actuator				, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			· · · · · · · · · · · · · · · · · · ·
Remove Constant Volume Mixing Boxe	8	LF	\$250	\$2,000	-	\$0	\$2,000
Hemove Constant Volume Mixing Doxe			42.55	42,000			,
Testing and Balancing	1	LS	-	-	_	-	\$1,880
resting and Dataneing							41,000
	-						
							·····
							1-
			ļ				
0.1							\$15,680
Subtotal							
Sales Tax @ 8%							\$1,254
Subtotal							\$16,934
Contractor OH & Profit @ 30%							\$5,080
Subtotal							\$22,015
Bond @ 1%							\$220
Subtotal							\$22,235
Estimating Contingency @ 10%							\$2,223
Total Probable Construction Cost							\$24,458

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B15

Location: Project Title	e: ECIP Facility E	gett, California nergy Improvement		•	Project No. Fiscal Year FY95
	ortion Name:	ECO B15 Com		Systems to Variable Ai	
Anaiysis Da	ate: June 1993		Economic Life:	15 YEARS	Preparer: KELLER & GANNO
1. Investme	ent Costs				
	ction Costs		\$122,292	-	
B. SIOH			\$6,726	-	
C. Design C	Cost		\$7,338	-	
-	st (1A+1B+1C)		\$136,355	•	
	Value of Existing E	auipment	4.00,000	\$0	
_	tility Company Reb	•		\$0	_
	estment (1D-1E-1F				 \$136,355
	(•		• •	4100,000
2. Energy S	Savings (+)/Cost(-)	•			
		d for Discount Facto	ors: October 1992	-	
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$18.23	863.6	\$15,743	11.70	\$184,188
B. Dist	\$4.98	0	\$0	13.78	\$0
C. Propane		0	- \$0	14.16	\$0
D. Other	NA	0	\$0	NA	NA NA
E. Demand			- \$0	11.70	\$0
F. Total	J	864	\$15,743		\$184,188
3. Non Ene	rgy Savings (+) or	Cost (-):			
A Annual R	lecurring (+/-)		(\$1,000)	•	
	t Factor (Table A)		(Φ1,000)	11.12	
	ted Savings/Cost (3A x 3A1)		11.12	(\$11,120)
		·			(411,120)
3. Non Rec	urring Savings (+)	or Cost (-)		•	
tem	Savings(+)	Year of	Discount	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
2 .	\$0	15	0.56	\$0	
o.	\$0	15	0.56	\$0	
c .	· \$0	15	0.56	\$0	
d. Total	\$0	0	0.00	\$0	
C Total Non	n Energy Discounte	ed Savings (3A2+3B	d4)	(\$11,120)	
. C:!- D	aubaak 1070E2 + 2	A 1 /2Dd1/F	- 1 if=>>.		
•	•	A+(3Bd1/Economic	C LITE)):	9.25	Years
LATAL BLAT	Discounted Saving	15 (2F5+3C):		\$173,068	

1.27

5.67%

6. Savings to Investment Ratio (SIR) 5/1G:

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

Engineers-Architects

	COMPUTED BY	PJB	1 FLOB	47 :	PROJECT 16-6	403-10
	CHECKED BY_	TIH		TRANSFORMER	- THE TE	m'
	DATE TER	2 19 <u>16</u> 19		DESCIZION		OF 5 SHEETS
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		FOR THE	Compati	r Room	AHD THE	5
		SAVE ON	ELECTE	UM COST	2.	
		ATRACE	-600 Pu	H IZAS MA	DE FIRST	
				emper Loan		
		HEXTIL	ithour. E	WTS # AT	10 B-7	
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FORM 101-1/8						
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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

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をCOB-17 SHEET 20F5

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".IFORNIA TITLE 24 COMPLIANCE - ALTERNATIVE 3

CRAC

---- CALIFORNIA TITLE 24 COMPLIANCE REPORT

ENERGY USE SUMMARY

-			PERCENT OF TOTAL	TOTAL	ADJUSTED UNIT SOURCE
	ELEC	GAS ==	ENERGY	ENERGY	ENERGY
	(kih/yr)	(kBtu/yr)	(X)=		(kBtu/yr-sf)
Primary Heating	0.0	25,995.8	5.6 =	27,364.0	2.9
Primary Cooling			•		
Compressor	13,891.0	0.0 .	10.2 -	142,244.0	14.9
Tower/Cond Fans	2,528.0	0.0	1.9 %	25,886.5	2.7
Condenser Pump	0.0	0.0	0.0 %	0.0	
Other Accessories	3,331.2	0.0	2.5	34,411.6	3.6 🖛
Auxiliary	·			-	
Supply Fans	60,840.6	0.0 =	44.8	623,008.9	65.2
Circulation Pumps	0.0	0.0	0.0	0.0	0.0 :
Base Utilities	. 0.0	0.0 😅	م ند 0.0	ند.0.0	a 0.0 🎿
Subtotal	60,840.6	0.0 -	44.8	623,008.9	65.2
hting	47,691.6	0.0 =	35.1	488,362.7	49.8
ceptacle	0.0 %	0.0 &	0.0	0.0	· 0.0 - ·
Domestic Hot Water	0.0:	0.0 🖘	0.0 =	0.0.3	0.0
Cogeneration	0.0.2	0.0 =	0.02	0.0	0.0 ≥
Totals	128.282.3	25.995.8	100_0 . 1	.340.977.6	139.0

ECO B-17 SHFRT3 0P5 PAGE

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

CALIFORNIA TITLE 24 COMPLIANCE - ALTERNATIVE 3

MZ-CRAC

------ CALIFORNIA TITLE 24 COMPLIANCE REPORT

Weather Name PASOROBL
Gross Conditioned Floor Area (sqft) 9,800
ACM Multiplier 1.025

FRERGY USE SUMBARY

•			PERCENT	TOTAL	ADJUSTED
			OF TOTAL	SOURCE	UNIT SOURCE
	ELEC -	GAS.≠	ENERGY	ENERGY	ENERGY
	(kih/yr)	(kBtu/yr)	(X) =	(kBtu/yr)	(kBtu/yr-sf)
Primary Heating	0.0	25,995.8	5.9	27,364.0	2.9
Primary Cooling					
Compressor	10,580.3	0.0	8.2	108,342.5	11.3
Tower/Cond Fans	2,243.8	0.0	1.7 ~	22,976.4	2.4 8
Condenser Pump	0.0	0.0 -	0.0	0.0	0.0
Other Accessories	2,913.9	0.0	2.2	29,838.4	3.1
Auxiliary					
Supply Fans ::	58,547.8	0.0 🎎	45.2	599;531.3	62.7
Circulation Pumps	0.0.	0.0	0.0	0.0	0.0 -
Base Utilities	0.0 ==	0.0 🌣	0.0.2	0.0	غاد 0.0
Subtotal	58,547.8	0.0 ₩	45.2	599;531.3	62.7.
Lighting	47,691.6	0.0==	36.8	488,362.7	49.8
Receptacle	0.0	0.0	0.0-2	0.0.	0.0
Domestic Hot Water	0.0:	0.0 5	0.0 🖫	0.0	. 0.0
Cogeneration	0.0	0.0 🚓	0.0	0.0	e. 0.0
Totals	121.977.4	25.995.8	100.0	1,276,415.3	132.3

Keller & Gannon

Engineers-Architects

COMPUTED BY P	13	ELO B-17	PROJECT 16-403-10
CHECKED BY BU	1992	REPLYCE TRANSFORMENZ	THE FEAT
REV.	19	CALLULTICATS	SHEET NO. 4 OF 5 SHEETS
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ALC:	1-15-1-	5 KILLOADINA OH 1	501\ V\$2
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		16 16 FIFTONETT	
	DUCTOH	of Arrecotor Mountaine	
			=1,820
			-
1	पा गय	me soo Run:	
	ENTERZIA Y	Salles = 128,282.3	KINH/YD
i	551 1/s/s-or		
		==121,977.4	15mH/4(3
		6305	KNH/TR.
	· · · · · · · · · · · · · · · · · · ·		
	MMATED	(ms	
	STERLIFE		
	Prior	TE XPPITE	\$900
			\$1500
	_ verx	THE SUB FLANTLEMBLE	
			\$2,400
+	Et. Fil	LOJITH FELIP FORM FO	
	1		
			
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FORM 101-1/8

Life Cycle Cost Analysis Summary ECO B17 Energy Conservation Investment Program (ECIP) Sheet 5 to 5

Location:	Fort Hunter Ligg : Relocate Transfor		Region No. 4		Project No. 16	
	rtion Name: ECO# I					
	te: March 1993		Economic Life: 2	20 YEARS	Preparer: KELL	ER & GANNO
•		-			•	
1. Investme				•		
A. Construc	tion Costs		\$2,400			
B. SIOH			\$132			
C. Design C			\$144	•		1,1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	st (1A+1B+1C)		\$2,676	\$0 ≉		
	Value of Existing Eq			\$0 ÷		
	ility Company Reba				\$2,676	•
G. TOTAL INV	estment (1D-1E-1F)				•	
2 Enemy S	avings (+)/Cost(-):					
		for Discount Factor	B			
Date of 1410	7.1.1.00 OZ.10 X 0000					
Energy	Cost -	Saving	Annual \$	Discount	Discounted	2,5
Source -	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	and the second
	,,,,,,					and the second
A. Elec.	\$18.23	21.5	\$392 .	14.53	\$5,700	
B. Dist	\$4.98	0.0	\$0⊅	17.63	\$0.2	والمرافق والمحارب
C. Propane	\$7.87	0.0	\$0.≇	18.59	\$0≅	1.00 miles (1.00 m
D. Demand	\$108.60	1.8	k = \$195	14.53	\$2,840	
E. Other	-		-		#D 540	
F. Total -			\$588		\$8,540	+ · · · · · · ·
		N4 / N.				3 - 2 - 2
3. Non Ener	rgy Savings (+) or (:OST (-):	<u>-</u>	- .		- Art
A American D			\$0**	. (2)		
	ecurring (+/-) t Factor (Table A)			13.59 📖		
	ted Savings/Cost (3	A x 3A1)			\$0.2	
(z) Discour	red carrings/cost (c			965		
R Non Rec	urring Savings (+)	or Cost (-)		· · · · · · · · · · · · · · · · · · ·	• •	
D. 140117100		5555()				
ltern	Savings(+)	Year of	Discount =	Doscounted Sav		
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2. 30=				3 4 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	يان پائيد	
b. ==						
C. ±.						
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C Total Nor	Energy Discounted	d Savings (3A2+3Bc	(4)	\$0. ፷	-1.	
			• •			
		A+(3Bd1/Economic	Life)):		* Years :	-
	Discounted Saving			\$8,540		4
	o investment Ratio			3.19	-	
7 - Adia seted	Internal Date of Ref	AIDEN		21,509	5 %	

Keller & Gannon

Engineers-Architects

COMPUTED BY RUB	FC0# 3-18	PROJECTI (6-403-10
DATE FFE 1913	ADD ZONE OPTIMIZER	
REV19	PRATEGY DESCRIPTION	SHEET NOOFSHEETS

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Keller & Gannon

Engineers-Architects

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CONSTRUCTION COST EST	IMAT	ΓΕ		Pate Prepared February	1993	Sheet 3	OF 5
Project EEAP Limited Energy Study			<u> </u>	Project No. 16-403-10	Basis for		
Location				10-403-10	Code A	(no design comp	eted)
Fort Hunter-Liggett, California					4		
Keller & Gannon							
ECO-B18 Zone Optimizer Control		Estimat RJB	or		Checked BIH	Ву	
11		antity		abor		Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
TYPICAL ZONE OPTIMIZER CONTRO							
Temperature Controller	1	Ea	\$33.91	\$34	\$165	\$165	\$199
Temperature Sensor	3	Ea	\$28.06	\$84	\$95	\$286	\$371
Relay	3	Ea	\$47.63	\$143	\$62	\$185	\$328
Wiring	1	Job	\$240	\$240	\$100	\$100	\$340
Subtotal, Optimizer Control							\$1,238
Sales Tax 8%							\$99
Contractor O.H. & P 30%							\$99
Sub Total							\$1,436
Bond 1%							\$14
Sub Total							\$1,450
Estimating Contingency 10%							\$145
Total Probable Construction Cost							\$1,595

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B18 Sheet 4 fo 5

6.6. ₹ Years

\$3,169

1.78 ₩

12.70% -

Discrete Port	Fort Hunter Ligg Add Zone Optimiz ion Name: ECO# I :: March 1993		Region No. 4 Economic Life: 15	; YEARS	Project No. 16 Fiscal Year F Preparer: KELL	
E. Salvage V F. Public Util	on Costs		\$1,595 \$88 \$96 \$1,778	\$0 - \$0 -	 	
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Factors	Annual \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec. B. Dist C. Propane D. Demand E. Other F. Total	\$21.84 \$4.96 \$7.87 \$108.60	12.4 0.0 0.0 0.0 k	\$271 \$0 = \$0 ± \$0 ±	11.70 13.78 14.16 11.70	\$3,169 \$0.2 \$0.2 \$0.2 \$3,169	
3. Non Energ	y Savings (+) or C	Cost (-):				
(1) Discount	curring (+/-) Factor (Table A) ed Savings/Cost (3)	A x 3A1)	\$0≇	11.12	\$0 %	
B. Non Recu	ming Savings (+) o	r Cost (-)				•
Item: ··	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Doscounted Savings(+)Cost(-)(4)		
a. = b. =: c. = d. Total						
C Total Non	Energy Discounted	l Savings (3A2+3Bd4)		\$0.2		ay raman gay

4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)):

5. Total Net Discounted Savings (2F5+3C):

6. Savings to investment Ratio (SIR) 5/1G: .

7. Adjusted Internal Rate of Return (AIRR):

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B18

Sheet 5 fo 5

Project No. 16-403-10 Region No. 4 Fort Hunter Liggett, California Location: Fiscal Year FY96 Project Title: Add Zone Optimizer Control Discrete Portion Name: ECO# B-18, Bldg 81 15 YEARS Preparer: KELLER & GANNON Economic Life: Analysis Date: March 1993 1. Investment Costs \$1,595 A. Construction Costs \$88 B. SIOH \$96 C. Design Cost \$1,778 D. Total Cost (1A+1B+1C) \$0 E. Salvage Value of Existing Equipment F. Public Utility Company Rebate \$1,778 G. Total Investment (1D-1E-1F) 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discount Discounted Energy Saving Annual \$ Cost Source MBTU/YR(2) Savings(3) Factor(4) Savings(5) \$/MTBU/(1) 2.7 \$58 11.70 \$680 A. Elec. \$21.84 B. Dist \$4.98 0.0 \$0 : 13.78 \$0 : C. Propane \$7.87 0.0 \$0 # 14.16 \$0 🙄 \$0.= 11.70 \$0 = D. Demand \$108.60 0.0 E. Other **\$58** \$680 F. Total 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) \$0 ₹ 11.12 (1) Discount Factor (Table A) (2) Discounted Savings/Cost (3A x 3A1) \$0 = B. Non Recurring Savings (+) or Cost (-) Doscounted Sav-Savings(+) Year of Discount Item Factor(3) ings(+)Cost(-)(4) Cost(-)(1) Occur. (2) a. b. . C. d. Total C Total Non Energy Discounted Savings (3A2+3Bd4) \$0 = 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): 30.6 Years 5. Total Net Discounted Savings (2F5+3C): \$680 6. Savings to Investment Ratio (SIR) 5/1G: 0.38

Negative

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

CHECKED BY. CHECKED BY. CHECKED BY. STORAGE STORAGE SHETNO. L OF L SHEE EN 1982 the Sollowing recommined from UNAS Mede: REFRIGERATION 15. Consolidate eating facility food storage. Recommend: Consider consolidating food storage facilities for the various eating facilities. Due to the remoteness of the base, food shipments are made less frequently than normal, requiring larger storage capacity. Savings could be accomplished by retaining only enough refrigerated storage for daily consumption at each of the smaller eating facilities. Projected Savings: 15 km, 32,850 km/yr, \$2,631.28/yr Payback Period: Immediate While Hes 15 an excellent condapt, the practices of consolidated food storage. While Hes 15 an excellent condapt, the practices of consolidated food storage. While Hes 15 an excellent condapt, the practices of consolidated food storage. While Hes 15 an excellent condapt, the practices of consolidated food storage. British facilities include the Consolidated for the practices include the Consolidated for the sacility (B-206), the snack bar(B-206 hours, facilities is mountaged thy a different control of the sacilities is mountaged thy a different control of the sacilities is monaged thy a different control of the sacilities in the prostorion faccount in grand responsibilities and for succession faccount in grand responsibilities and for succession faccount in grand responsibilities and for succession faccount in grand free provided storage facilities for the new commission of the succession factor of th	COMPUTED BY 8//	4	CONSOLO	DATE FOOI	PROJECT 16-403-10
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of new cold storage Lucility has been built next to the new commissary. (B-182) which consolidates several.	300011	77625 1	> mod	aged ng	Carrer on
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built next to the new commissary, (B-182) which consolidates several,					
(B-182) which consolidates several,	arrow	ge.			
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(B-182) which consolidates several,	hull	-	L- L-	Le news	STANINISS OF
cold storage Sacilities that were	7-	X		7.1	15
cold storage sacrliters that work	<u> </u>	182)	Wurch	C0715011d	ques several,
WAY 220 -	Mold	-510110	ear Sad	liters the	+ were
* / ** \\		771	1	HUAUS D	CPE Same

Kelier & Gannon

Engineers-Architects

COMPUTED BY T CASE ECO B-21	PROJECT 16-403-10 EFAI FHL
DATE MARCH 1973 BOILER CR BURNER.	EFAIL
REV19REPLACEMENT	SHEET NO OF ZL_SHEETS
DESCRIPTION OF ACTION REMOVE EXISTING BURNERS ON LOW COMBUSTION EFFICIENCIES OR REF WITH HIGH RADIANT OR CONVECTIVE L WITH HIGH EFFICIENCY BURNERS OR EAFICIENCY BOILER,	PLAKE BOILERS LOSSES. REPLAKE
- FACULTIFE TO COURT	
FACILITIES INCLUDED REFER TO ATTACHED SPREADSHEET	T PRINTOUT.
ENERGY SAVING CALCULATIONS	e de desar e e e e e e e e e e e e e e e e e e e
THE FUEL USAGE OF THE EXIST HAS BEEN SIMULATED USING TRACE	E 600
COMPUTER RUNS OR OTHER CALC, MET	
OF FUEL DELINERY. THE FIRING EN	
OF THE NEW BURNERS AND BOIL OBTAINED FROM MANUES PUBLISHE	
THE EXISTING FIRING EFFICIENCIES	5 WERE
RECOLDS. OTHER LOSSES WELL BY	
CONDITION OF BOILER AT THE TIME	
TNSPECTON.	

HIGH EFFICIENCY BOILER CONVERSION

£	A STATE STATE STATE	Boller System Data	m Deta		Existing Boller System osses	er Svetern	2000				
3	Bankallandam Atlanta		ŀ								
<u>.</u>	Frederican Name	2	g/stem	Capacity	Firing	And-	Rediant	Convection	Shut-Down	General	3
		Peen n	Туре	нота	盂	Hary					15
5	Charles Charles Charles										
-	The second of th	S S S S	AHU-HWB/CW	300,000	85.9%	•	8 0.0%	4.0%	2.0%	3.0%	84.8%
	(and one)		· · · · · · · · · · · · · · · · · · ·		•,			-			
	Hadenda, Dwellings	Electric	ERPH	30 x 3kW=80kW		•	•		•		•
	all to reduce	A State State	F 14 7 8 7	At the south the							
P 128	Officers Querters Military	Properse	FCU-HWB/CW	567,000	×6.68		80%	4.0%	208	200	73.66
8 197	Admin Bidg R&D - Office	Properse	AHU-PROP/DX	284,000+	88		N N	A P	/AC 6	2 2	80.5
	Admin Bidg R&D - Electronics	Electric	Wind Ao + ER	30kW Ht. 2x1.5R		•	} '	2	8 0.7	5	5.30
P 209	AAFES Snack Bar	Properse	RTAHU-HWB/DX	280,000	77.2%	1	8	70 8	2000	. 8	. 8
P 252	Vehicle Maint Shop DS	Fuel Q	HWB-UH/R	A50 000	77 75			200	80.3	800	01.6%
P 256	Vehicle Maint Shon OBG	2	UNVD-11L/O				20.5	60.0%	Z.0%	2.0%	73.0%
900		5	unoquu	2/0/000	82.7%	•	4.0%	3.0%	2.0%	2.0%	7.7%
83	Vernicie Maurit Shop OHG	Fuel O	HWB-UH/R	650,000	84.9%	٠	4.0%	3.0%	2.0%	2.0%	73.9%
280 280	Electron Equip Facility	Properse	AHU-PROP/CW	1,020,000	%8'08		80.08	4.0%	2.0%	30%	R3 894
		Electric	Window AC/ER	36.8 kW				•	•	2	
S 291	Cont Humid Warehouse	Properte	AHU-STM/DX	1,020,000	78.8%	30%	7.0%	4.04	20%	38	10 00
P 285		Propers	FCU-HWB/CW	3,250,000	7.73		8.0%	8.0%	2.0%	30%	80.0% 26.0%
P 642	Detached Letrine/Shower	Properse	HWH/TK-Cho	180,000	75.2%		7.9%	4.0%	2.0%	30%	2 2
											2

HIGH EFFICIENCY BOILER CONVERSION

3		New Boiler System	rstem Losses	92								
3 4	emely notalisated									Energy	Energy	Annual
į		Firhod	Andl-	Radlant	Convection	Shut-Down	General	Ž	Effiency	Usage	Savings	1 600
		ŧ	je v					盂	Increase	(MBTU/YR)	(MBTU/YR)	Savings (\$)
P 101	Open Din Cons (Haclenda)	84.0%		4.0%	2.0%	2.0%	1.0%	85.0%	17.1%	1064	214	\$1,685
i	Club (Ber)											
	Haciende, Dwellings	•		•		•	•					
						1000	3	95.00	10.000	838.0	8	\$708
P 128	Officers Quarters Military	8 .0%	•	4.0%	2.0%	85.7	65.	82:03	80.21	3		
S 197	Admin Bidg R&D - Office	\$ 0.7 \$		4.0%	2.0%	2.0%	1.0%	85.0%	16.0%	262.4	\$	# 2
	Admin Bida R&D - Electronics	•	•	•	•			•				
0000	AAFES Spack Ber	94.0%		4.0%	2.0%	2.0%	1.0%	85.0%	23.8%	84.8	24	\$18/
696	Vehicle Moint Shon DS	94.0%		¥0.4	2.0%	2.0%	1.0%	85.0%	12.0%	900.5	127	866\$
300	Valida Main Short OBG	94.0%		4.0%	2.0%	2.0%	1.0%	85.0%	13.3%	403	63	\$498
8 2	Welling Wall Shop Old	94 68		4.0%	2.0%	2.0%	1.0%	85.0%	11.1%	6'686	130	\$1,020
800	Flection Equip Facility	2.9%		4.0%	2.0%	2.0%	1.0%	85.0%	21.2%	741.5	185	\$1,455
3				•	,	•		,				
3	On at 14 and Wasshares	26.0%	30%	40%	2.0%	2.0%	1.0%	85.0%	25.2%	375.2	111	\$874
182	Controlled Waterbase	90.00		40%	2.0%	2.0%	1.0%	85.0%	25.3%	1014.5	302	\$2,380
20	Emilia Na China	9		200	200	2.0%	1.0%	85.0%	25.9%	116.7	107	\$843
P 642	Detached Lauring/Shower	200					Totale of Suc	Totals of Successfull Reparements	ments		916	\$7,206

<u>ė</u>	Installation Name			
		Savings (\$)	Capitol	ā
P 101	Open Din Cons (Hacienda)	\$23,854	\$6,941	3.4
	Glub (Bar) Hacienda, Dwellings			
P 128	Officers Quarters Military	\$10,020	\$10,217	9
S 197	Admin Bldg R&D - Office	\$5,493	\$6.364	60
	Admin Bldg R&D - Electronics			}
P 209	AAFES Snack Bar	\$2,650	\$6.364	70
P 252	Vehicle Maint Shop DS	\$14,128	\$12.557	=
P 256	Vehicle Maint Shop ORG	\$7,045	\$6.364	=
P 259	Vehicle Maint Shop ORG	\$14,449	\$12.557	-
S 290	Electron Equip Facility	\$20,609	\$15,783	1.3
S 291	Cont Humid Warehouse	\$12.380	\$15 795	80
P 295	Enl Barracks w/o Dining	\$33,695	\$36.188	80
P 642	Detached Latrine/Shower	\$11,934	\$5,327	2.2
		\$102,039	\$69,756	1.5
	•			

				1993 Sheet 5 or 7 /				
Project EEAP Limited Energy Study Location				Project No. Basis for Estimate				
			Code A (no design competed)					
		·						
101	Estimato	r		Checked By				
Qua	ntity	i L	abor	Mat	erial			
No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost		
1	EA	\$750	\$750		\$0	\$750		
 		V				·		
1	EA	\$1,050	\$1,050	\$2,650	\$2,650	\$3,700		
	<u> </u>	!						
-								
		-						
\perp								
+								
+						\$4,450		
+ -						\$356		
1 1						\$4,806		
					A	\$1,442		
1 1						\$6,248		
						\$62		
						\$6,310		
						\$631		
						\$6,941		
	No. Units	O1 Cuantity No. Unit Units Meas.	No. Unit Per Unit Meas. Unit 1 EA \$750	O1 Cuantity Labor No. Unit Per Unit Total 1 EA \$750 \$750	O1 Cuantity Labor Mat No. Unit Per Units Meas. Unit Total Unit 1 EA \$750 \$750	O1 Cuantity Labor Material No. Unit Per Meas. Unit Total 1 EA \$750 \$750 \$0		

CONSTRUCTION COST ESTIMATE					sared Sheet Of Z /			
Project EEAP Limited Energy Study			· •	Project No.	Basis for Esti		Λ.	
Fort Hunter-Liggett, California					Code A (no	design competed	1)	
Keller & Gannon		Estimato			Checked By			
ECO B-21, REPLACE BOILERS, BLDG 12		Criscisci By						
Line Item	Quantity			abor Total			Total Cost	
Demolish existing boiler	1 1	EA	\$850	\$850		\$0	\$850	
Provide & Install 570,000 btuh boiler	1	EA	\$1,400	\$1,400	\$4,300	\$4,300	\$5,700	
	-							
	+							
	+							
				·				
								
	-							
Subtotal	+						\$6,550	
Sales Tax @ 8%	1						\$524	
Subtotal							\$7,074	
Contractor OH & Profit @ 30%							\$2,122	
Subtotal							\$9,196	
Bond @ 1%							\$92	
Subtotal Estimating Contingency © 10%							\$9,288	
Estimating Contingency @ 10% Total Probable Construction Cost							\$929 \$10,217	
. Can i resusie consudenti cost							Ψ10,217	

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CONSTRUCTION COST EST		February 1993 Sheet Of 2/						
CONSTRUCTION COST EST	INATE			Project No. Basis for Estimate				
Project				Code A (no design competed)				
EEAP Limited Energy Study								
Fort Hunter-Liggett, California								
Keller & Gannon								
Drawing No.		Estimator			Checked By			
ECO B-21, REPLACE BOILERS, BLDG 1	97	ntity	L	abor	Material			
Line Item	No. Units	Unit Mess.	Per Unit	Total	Per Unit	Total	Total Cost	
						- 42	A==0	
Demolish existing boiler	11	EA	\$750	\$750		\$0	\$750	
		ļ					44.444	
Provide & Install 264,000 btuh boiler	11	EA	\$930	\$930	\$2,400	\$2,400	\$3,330	
		†						
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		1						
		Ţ						
Subtotal							\$4,080	
Sales Tax @ 8%							\$326	
Subtotal							\$4,406	
Contractor OH & Profit @ 30%							\$1,322	
Subtotal	1						\$5,728	
Bond @ 1%	1			†			\$57	
Subtotal					 		\$5,786	
	_				 		\$579	
Estimating Contingency @ 10%		\vdash			 		\$6,364	
Total Probable Construction Cost	_				-	 	40,004	
	ı	1 1		1	1			

				Date Prepared		Sheet Of			
CONSTRUCTION COST ESTIF	MATE			February					
Project EEAP Limited Energy Study				Project No.	Basis for Estimate				
Fort Hunter-Liggett, California Engineer-Architect					Code A (no design competed)				
Engineer-Architect					1				
Keller & Gannon Drawing No.		Estimato	·		Checked By				
ECO B-21, REPLACE BOILERS, BLDG 20		Glecked by							
Quant Line Item No. Units			Per	abor	Mat Per	orial	Total		
		Unit Meas.	Unit	Total	Unit	Total	Cost		
			6750	¢750		\$0	\$750		
Demolish existing boiler	1	EA	\$750	\$750		\$0	\$75 0		
Provide & Install 280,000 btuh boiler	1	EA	\$930	\$930	\$2,400	\$2,400	\$3,330		
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Subtotal							\$4,080		
Sales Tax @ 8%							\$326		
Subtotal Substitution of the Control							\$4,406		
Contractor OH & Profit @ 30%							\$1,322		
Subtotal							\$5,728 \$57		
Bond @ 1% Subtotal		\vdash					\$5,786		
Estimating Contingency @ 10%		 					\$5,786		
Total Probable Construction Cost							\$6,364		
							, ,		

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CONSTRUCTION COST EST	February 1993 Sheet Of Z/									
Project				Project No.	Project No. Basis for Estimate					
EEAP Limited Energy Study				<u> </u>	Code A (no design competed)					
Fort Hunter-Liggett, California						,				
Engineer-Architect										
Keller & Gannon Drawing No.		Estimato	,		Checked By					
ECO B-21, REPLACE BOILERS, BLDG 2	CO B-21, REPLACE BOILERS, BLDG 252									
	Line item No. Units			abor	Materi Per		Total			
Cite Nam		Mess.	Unit	Total	Unit	Total	Coet			
				44.000		**	64 000			
Demolish existing oil boiler	1	EA	\$1,000	\$1,000		\$0	\$1,000			
		-	04.505	C4 505	¢E EOE	\$5,525	\$7,050			
Provide & Install 650,000 btuh boiler		EA	\$1,525	\$1,525	\$5,525	\$5,525	\$7,050			
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	 						\$0.0F0			
Subtotal		ļ	ļ	ļ — —			\$8,050			
Sales Tax @ 8%		<u> </u>	<u> </u>				\$644			
Subtotal	_	ļ	ļ				\$8,694			
Contractor OH & Profit @ 30%		ļ		<u> </u>	ļ		\$2,608			
Subtotal		ļ			1		\$11,302			
Bond @ 1%			ļ				\$113			
Subtotal .	·	ļ					\$11,415			
Estimating Contingency @ 10%		<u> </u>	ļ				\$1,142			
Total Probable Construction Cost	1			1]		\$12,557			

CONSTRUCTION COST EST	Date Prepared February	ry 1993 10 21						
Project EEAP Limited Energy Study				Project No.	Basis for Estimate			
Fort Hunter-Liggett, California Engineer-Architect			Code A (no design competed)					
Keller & Gannon								
Drawing No.	7	Checked By						
ECO B-21, REPLACE BOILERS, BLDG 256				abor Material				
Line Item	No. Units	Unit Meas.	Per Unit	abor Total	Per Unit	erial Total	Total Cost	
Demolish existing oil boiler	1	EA	\$750	\$750		\$0	\$750	
Provide & Install 270,000 btuh boiler	1	EA	\$930	\$930	\$2,400	\$2,400	\$3,330	
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Subtotal	1						\$4,080	
Sales Tax @ 8%	 						\$326	
Subtotal	†						\$4,406	
Contractor OH & Profit @ 30%	1						\$1,322	
Subtotal	1		1				\$5,728	
Bond @ 1%		\neg					\$57	
Subtotal							\$5,786	
Estimating Contingency @ 10%	1						\$579	
Total Probable Construction Cost							\$6,364	
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				Date Prepared		Sheet Of		
CONSTRUCTION COST ESTIN	/ATE			February	1993			
Project EEAP Limited Energy Study				Project No.	Basis for Estimate			
Fort Hunter-Liggett, California				Code A (no design competed)				
Engineer-Architect								
Keller & Gannon Drawing No.	<u> </u>	Checked By						
ECO B-21, REPLACE BOILERS, BLDG 259	9	Estimato						
ECO B-21, REFEROL BOILLING, BEDG 200	Qua	intity	L	abor	Mater	ial		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
			ļ				24.000	
Demolish existing oil boiler	1	EA	\$1,000	\$1,000		\$0	\$1,000	
			ļ			w .		
Provide & Install 650,000 btuh boiler	1	EA	\$1,525	\$1,525	\$5,525	\$5,525	\$7,050	
	<u> </u>	 						
		-		<u> </u>				
		<u> </u>						
	ļ							
Subtotal							\$8,050	
Sales Tax @ 8%							\$644	
Subtotal							\$8,694	
Contractor OH & Profit @ 30%		 -					\$2,608	
Subtotal							\$11,302	
		 					\$113	
Bond @ 1%							\$11,415	
Subtotal				<u> </u>				
Estimating Contingency @ 10%							\$1,142	
Total Probable Construction Cost							\$12,557	

CONSTRUCTION COST ESTI	February 1993 Sheet 12 of 21							
Project EEAP Limited Energy Study Location				Project No.	Basis for Est			
Fort Hunter-Liggett, California Engineer-Architect				Code A (no design competed)				
Keller & Gannon Drawing No.		Te.e			0: 1.5			
ECO B-21, REPLACE BOILERS, BLDG 29	0	Estimato	×		Checked By			
	Qua	intity	1	abor	Mate	erial		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
Demolish existing boiler	1	EA	\$1,200	\$1,200		\$0	\$1,200	
Describe & Leader H d 000 000 L t L t H			4	4				
Provide & Install 1,020,000 btuh boiler	1	EA	\$1,675	\$1,675	\$7,250	\$7,250	\$8,925	
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Subtotal							\$10,125	
Sales Tax @ 8%		[\$810	
Subtotal							\$10,935	
Contractor OH & Profit @ 30%							\$3,281	
Subtotal Bond @ 1%							\$14,216	
Subtotal	-+						\$142	
Estimating Contingency @ 10%							\$14,358	
Total Probable Construction Cost	-						\$1,436 \$15,793	
The state of the s							J 10./93	

				Date Prepared	4000	Sheet Of	71	
CONSTRUCTION COST ESTIN	February							
Project				Project No. Basis for Estimate				
EEAP Limited Energy Study					Code A (n	o design competed	t)	
Fort Hunter-Liggett, California							•	
Engineer-Architect								
Keller & Gannon Drawing No.		Estimato	,		Checked By			
ECO B-21, REPLACE BOILERS, BLDG 291	1							
	Qua	ntity		abor	Mai Per	terial	Total	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Cost	
Demolish existing boiler	1	EA	\$1,200	\$1,200		\$0	\$1,200	
Provide & Install 1,020,000 btuh boiler	1	EA	\$1,675	\$1,675	\$7,250	\$7,250	\$8,925	
		 						
								
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		ļ			<u> </u>			
Subtotal							\$10,125	
Sales Tax @ 8%							\$810	
Subtotal							\$10,935	
Contractor OH & Profit @ 30%							\$3,281	
Subtotal							\$14,216	
Bond @ 1%							\$142	
Subtotal							\$14,358	
Estimating Contingency @ 10%							\$1,436	
Total Probable Construction Cost							\$15,793	

CONSTRUCTION COST EST	Pebruary	1993 Sheet 14 or Z/					
Project EEAP Limited Energy Study		Project No.	Basis for Estim				
Fort Hunter-Liggett, California					Code A (no	design competed)	
Engineer-Architect							
Keller & Gannon Drawing No.		Estimato	r		Checked By		
ECO B-21, REPLACE BOILERS, BLDG 2	95						
Line Item	Qua No.	ntity Unit	Per	abor	Mater Per	ial	Total
Life Reli	Units	Meas.	Unit	Total	Unit	Total	Cost
Demolish existing boiler	1	EA	\$1,500	\$1,500		\$0	\$1,500
Provide & Install 3,250,000 btuh boiler	1	EA	\$2,800	\$2,800	\$18,900	\$18,900	\$21,700
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Subtotal							\$23,200
Sales Tax @ 8%	-						\$1,856
Subtotal							\$25,056
Contractor OH & Profit @ 30%							\$7,517
Subtotal							\$32,573
Bond @ 1%							\$326
Subtotal	_						\$32,899
Estimating Contingency @ 10%	-						\$3,290
Total Probable Construction Cost							\$36,188

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CONSTRUCTION COST FOR	18.4 A T			Date Prepared	1000	Sheet Of	۲1.	
CONSTRUCTION COST EST	IMAIE	:		February	1000			
Project EEAP Limited Energy Study				Project No.	Basis for Estimate			
Fort Hunter-Liggett, California					Code A (no	design competed)		
Engineer-Architect	******				1			
Keller & Gannon Drawing No.		Estimato						
ECO B-21, REPLACE BOILERS, BLDG 6	42	Estimato			Checked By			
	Que	intity		abor	Mater	ial		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
Demolish existing boiler	1	EA	\$750	\$750	·	\$0	\$75	
Definition existing boiler	+ -	-	Ψ/30	Ψ/30		Ψ0	4/3	
Provide & Install 180,000 btuh boiler	1	EA	\$840	\$840	\$1,825	\$1,825	\$2,66	
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Subtotal	 						¢0 441	
ales Tax @ 8%	11						\$3,41 \$27	
Subtotal							\$3,68	
contractor OH & Profit @ 30%							\$1,100	
Subtotal							\$4,79	
ond @ 1%							\$4	
A			. 1				\$4,843	
Subtotal								
stimating Contingency @ 10% Total Probable Construction Cost							\$484	

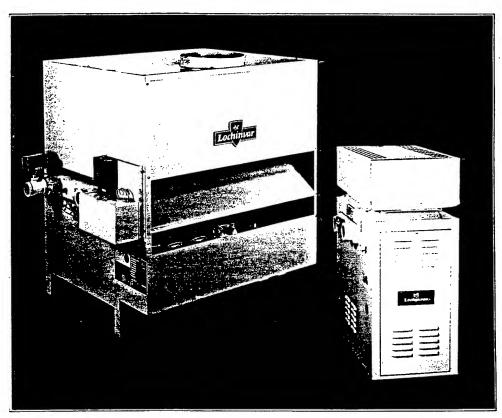
Life Cycle Cost Analysis Summary ECO C9 Energy Conservation Investment Program (ECIP) Sheet of ZI

Location:	Fort Hunter Ligg		Region No. 4			Project No. 16-403-10
-	Replace Low Effic	-				Fiscal Year FY96
	ion Name: ECO#	B-21		4	VE400	Despera KELLED & CANING
Analysis Date	e: March 1993		Economic Life:	15	YEARS	Preparer: KELLER & GANNO
1. Investment						
A. Constructi	on Costs		\$69,756			
B. SIOH			\$3,837			
C. Design Co			\$4,185			
	(1A+1B+1C)		\$77,778		**	
	alue of Existing Ed				\$0	_
	ty Company Reba				\$0	
G. Total Inves	stment (1D-1E-1F))				\$77,778
O Emargu Sa	vingo (I \/Cost(\)					
Date of NIST	vings (+)/Cost(-): R 85-3273-X Used	d for Discount Factor	rs			
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A F 1					14.70	¢n.
A. Elec.	\$21.84	0.0	_ \$0		11.70	\$0 **
B. Dist	\$4.98	0.0	\$0		13.78	\$0 \$100,000
C. Propane	\$7.87	915.7	\$7,206		14.16	\$102,039
D. Demand	\$108.60	0.0	k \$0		11.70	\$0
E. Other						****
F. Total			\$7,206			\$102,039
3. Non Energ	y Savings (+) or (Cost (-):				
A. Annual Re	curring (+/-)		\$ 0			
(1) Discount F	Factor (Table A)				11.12	
(2) Discounte	d Savings/Cost (3	3A x 3A1)				\$0
B. Non Recur	ring Savings (+)	or Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.			_			
b.			-			
C.						
d. Total			-			
C Total Non E	Energy Discounted	d Savings (3A2+3Bo	14)		\$0	
4 Simple Pay	hack 1G//2F3±3/	A+(3Bd1/Economic	l ife)\·		10.8	Years
	iscounted Saving		што <i>јј.</i>		\$102,039	
	Investment Ratio	•			1.31	

7. Adjusted Internal Rate of Return (AIRR):

170 = 21 ECO B-21

Copper-Fin® Boilers

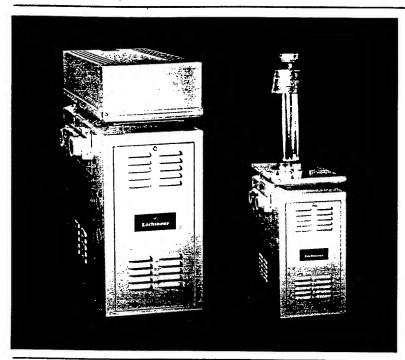




COPPER-FIN®—the energy efficient concept for today—and tomorrow!

- 22 models—capacities to 3,080,000 BTU—a size for every application
- Boiler design provides total protection from thermal shock
- Fin tube heat exchanger provides scale free performance
- Immediate response to heating demands
- Compact, lightweight construction
- A complete range of firing control and safety options
- Easily the most servicable Boiler on the market

Meets ASHRAE 90A-1980 Energy Efficiency Standards.



Standard Equipment

- Dial type temperature, pressure and altimeter gauge.
- Copper fin tubes.
- Atmospheric burners.
- Master on-off switch. Redundant gas valve.
- Adjustable high limit.
- ASME pressure relief valve- 30 PSI.
- Indoor or outdoor installation.
- 24 volt control system with transformer.
- Adjustable aquastat.
- Combination gas valve.
 Slideout burner tray.
- Completely enclosed controls.
- Thermocouple supervised pilot, 100% shut-off.

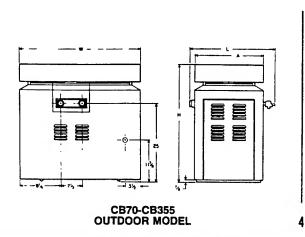
Optional Equipment

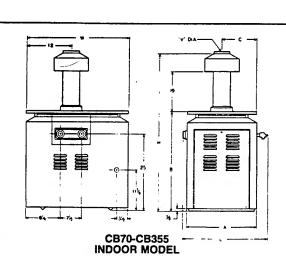
■ Intermittent pump controller ■ Cupro-nickel heat exchanger ■ Indoor/outdoor control ■ Low water cut-off Flow switch ■ Modusnap valve ■ High/low gas pressure safety switch ■ Alarm Bell—120V ■ Manual reset high limit ■ Module-Pak sequence firing ■ Thermometer

Model Number	BTU Input	BTU Output	Min. Pipe Size	Gas Conn. Size	"H" Height	"W" Width	"L" Length	"V" Vent	"A"	"B"	"C"	Weight
Indoor Mo	dels											
CB70	72,000	57,600	2"	1/2"	57¾	28	17	4	12	323/8	6	185
CB110	108,000	86,400	2"	1/2"	581/4	28	19	5	14	32%	7	195
CB150	144,000	115,200	2"	1/2"	59	28	201/2	6	151/2	32%	73/4	210
CB215	216,000	172,800	2"	1/2"	60	28	24	7	19	32%	91/2	232
CB255	252,000	201,600	2"	3/4"	611/4	28	26	8	21	32%	101/2	251
CB355	355,000	284,000	2"	3/4"	611/2	28	32	9	27	32%	131/2	292
Outdoor M	lodels									0270	1072	202
CB70	72,000	57,600	2"	1/2"	39%	28	17		12			185
CB110	108,000	86,400	2"	1/2"	39%	28	19		14			195
CB150	144,000	115,200	2"	1/2"	39%	28	201/2		151/2			210
CB215	216,000	172,800	2"	1/2"	39%	28	24		19			232
CB255	252,000	201,600	2"	3/4"	39%	28	26		21			251
CB355	355,000	284,000	2"	3/4"	39%	28	32		27			292

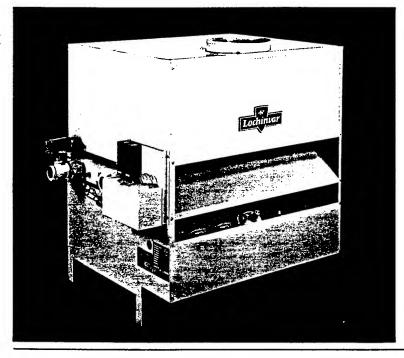
NOTES: 1. NOTE: LP gas models maintain full rated input—no derating required on these models.

2. Capacity ratings are actual heater performence at 80% combustion efficiency.









Standard Equipment

- Dial type temperature, pressure and altimeter gauge.
- Copper fin tubes.
- Atmospheric burners.
- Redundant gas valve.
- Adjustable high limit.
- ASME pressure relief valve—50 PSI.
 Spark ignition. (CB475-CB3080)
- 24 volt controls.
- Built-in draft diverter.
- Off/On switch with indicator light.
- Removable burner tray.
- Enclosed control panel.
- Adjustable aquastat.
- Main gas pressure regulator and pilot regulator.

- Manually operated main gas cock and pilot gas cock. Low Water Cut-Off (probe type). (CB1540-CB3080) Module Firing—Standard on models CB1700 and
- Leak test gas cock. (CB1540-CB3080)
- Flow switch. (CB1540-CB3080)

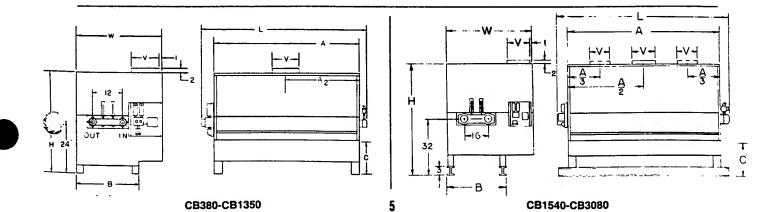
Optional Equipment

■ Intermittent pump controller ■ Cupro-nickel heat exchanger ■ Indoor/outdoor control ■ Low water cut-off ■ Flow switch ■ Modulating gas valve ■ High/low gas pressure safety switch ■ Alarm Bell—120V ■ Manual reset high limit ■ Module-Pak sequence firing ■ Additional solenoid gas valves ■ Motorized gas valve

■ Thermometer

	BTU	BTU	Coo				DIMENS	IONS		С	Ship
MODEL	input Naturai Gas	Output Natural Gas	Gas Conn. Size	V Vent	L † Length	W † Width	H He l ght	A	В	Gas Inlet	Wgt.
CB380	DISCONT	INUED									
CB475	475,000	380,000	1	10	43	351/2	47	351/2	261/2	14	692
CB570	570,000	456,000	4	12	48	351/2	47	401/2	261/2	14	756
CB665	665,000	532,000	1	12	53	351/2	47	451/2	261/2	14	820
CB760	760,000	608,000	1	14	58	351/2	47	501/2	261/2	14	884
CB855	855,000	684,000	1	14	63	351/2	47	551/2	261/2	14	948
CB940	940,000	752,000	1	14	68	351/2	47	601/2	261/2	14	1012
CB1120	1,118,400	894,000	11/4	16	78	351/2	47	701/2	261/2	14	1180
CB1210	1,206,400	965,000	11/4	16	83	351/2	47	751/2	261/2	14	1238
CB1350	1,350,000	1,080,000	11/4	18	93	351/2	47	851/2	261/2	14	1300
CB1540	1,540,000	1,232,000	11/2	18	721/4	57	67%	65%	351/2	11	1360
CB1700	1,694,000	1,355,200	2	20	771/2	57	675⁄s	70 %	351/2	11	1420
CB2000	2,002,000	1,601,600	2	20	88	57	67%	811/6	351/2	11	1660
CB2310	2,310,000	1,848,000	2	2-16	981/2	57	67 5/ s	91%	351/2	11	1900
CB2620	2,618,000	2,094,400	2	2-18	109	57	675/s	1021/8	351/2	11	2140
CB3080	3,080,000	2,464,000	2	2-18	1243⁄4	57	67%	1177/8	351/2	11	2500

†Dimensions are for models equipped w standard firing control systems.



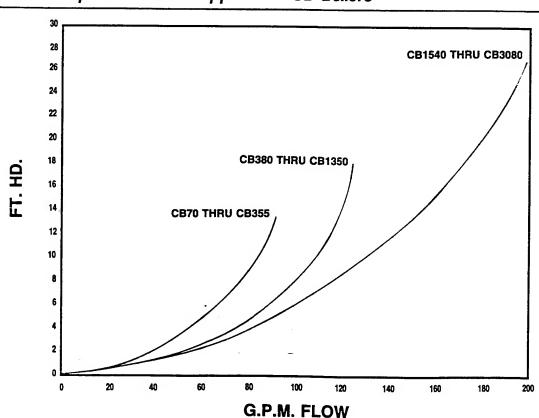
Temperature Rise Chart

Eco B-21

				0° T		TZ 20°		∆T :0°		0°		ΔT ώ°		:0° 7.1
Model No.	Input	Output	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD	GPM	FT.HD
CB-70	72,000	57,600	11.52	0.2	5.76	0.05								
CB-110	108,000	86,400	17.29	0.5	8.64	0.15	5.76	.045					_	
CB-150	144,000	115,000	23.05	0.8	11.52	0.2	7.68	.085	5.76	.05				
CB-180	180,000	144,000	28.81	1.2	14.41	0.29	9.60	0.14	7.20	.08				
CB-215	216,000	172,800	34.58	1.7	17.29	0.5	11.52	0.2	8.64	0.11				
CB-255	252,000	201,600	40.34	2.3	20.17	0.61	13.44	0.28	10.08	0.15				
CB-355	355,000	284,000	56.83*	4.9	28.41	1.2	18.94	0.55	14.21	0.3				
CB-380	DISCONTI	NUED												
CB-475	475,000	380,000	76	4	38	1.5	25	1						
CB-570	570,000	456,000	91	6	46	2	30	1	23	1				
CB-665	665,000	532,000	106*	6†	53	2.5	36	1.5	27	1				
CB-760	760,000	608,000	122*	6†	61	2.5	41	1.5	30	1	24	1		
CB-855	855,000	684,000	137°	6†	68	3	46	1.5	34	1	27	1	23	1
CB-940	940,000	752,000	151*	6 †	75	4	50	2	38	1.5	30	1	25	
CB-1120	1,120,000	894,000	179*	6†	89	6	60	2.5	45	1.5	36	1.5	30	
CB-1210	1,210,000	965,000	193*	6†	97*	8†	64	3	48	2	39	1.5	37	1
CB-1350	1,350,000	1,080,000	216°	6†	108*	10†	72	3.5	54	2	43	1.5	36	1.5
CB-1540	1,540,000	1,232,000	247*	11†	123°	11†	82	4	62	2.5	49	2	41	1.5
CB-1700	1,700,000	1,355,000	271*	11†	136*	11†	90	5	68	3	54	2	45	1.5
CB-2000	2,000,000	1,601,000	321*	11†	160*	11†	107	6.5	80	4	64	2.5	53	2
CB-2310	2,310,000	1,848,000	370*	11†	185*	11†	123	9	92	5	74	3	62	2.5
CB-2620	2,620,000	2,094,000	419*	11†	210*	11†	140*	11†	105	6.5	84	4	70	3
CB-3080	3,080,000	2,464,000	493*	11†	247*	11†	164°	11†	123	9	99	6	82	4

* FLOW RATE EXCEEDS RECOMMENDED FLOW RATES OF THE BOILER. IF THESE SYSTEM TEMPERATURE RISES ARE USED, AM EXTERNAL PIPING BY-PASS SHOULD BE INSTALLED AS SHOWN IN FIG. 1 (AT RIGHT). †FOOT HEAD CALCULATIONS FOR MAXIMUM ALLOWABLE FLOW RATE OF BOILER.

Pressure Drop—Lochinvar Copper-Fin® CB Boilers



ECO B-21

Typical Specification

BOILER—The hot water boiler shall be	LOCHINVAR COPPER-FIN MODEL	CB, having an input rating of
BTU/HR input and	BTU/HR output.	, , , , , , , , , , , , , , , , , , ,
	of the "fin-tube" 2 page decign, with of	troight golid soppor tubos beries and add

The water containing section shall be of the "fin-tube," 2 pass design, with straight solid copper tubes having extruded integral fins spaced 7 fins per inch. Tubes shall be securely rolled into glass-coated, cast iron headers with inspection coverplates removable from either end of the heat exchanger for purposes of inspection, cleaning, or repair. Heat exchanger shall be mounted on a stress-free steel framework (Models CB380-3080) in order to provide a "free-floating" design, able to withstand the effects of thermal shock. Heat exchanger shall carry a five year limited warranty against failure caused by defective workmanship or material.

The boiler shall bear the ASME "H" stamp and shall be National Board listed for 160# working pressure. The combustion chamber shall be enclosed by high temperature resistant, spall-proof refractory, which shall be modular for ease of replacement in sections. Boiler shall be constructed with a 16 gauge jacket, galvanized inside and outside, and protected with a 3 coat acrylic finish. Boilers CB380-3080 shall have a built-in draft diverter contained entirely within the jacket, and requiring no additional external drafthood devices. Models CB70-355 shall be available with either indoor or outdoor vent kits (specify). The boiler shall contain 3½ inches of high density fiberglass insulation.

Standard controls and equipment shall include: Copper fin tubes, atmospheric ribbon-type burners of aluminized steel, 100% safety pilot shutdown, control aquastat, electric hi-limit, redundant gas valves, manual gas cock, main and pilot gas pressure regulators, master switch, ASME pressure relief valve. Boiler shall meet the energy efficiency standards of ASHRAE 90A-1980. Boiler shall be A.G.A. or U.L. approved and listed.

The Firing Control System shall be______, (options below). Prefix "F" denotes standard on/off firing; prefix "M" denotes module firing.

F1 Standard equipment for Models CB70-CB380. Thermocouple supervision, standing pilot.

F9 Standard equipment for CB475 through CB1540. Electronic pilot supervision, spark ignition. 4 second main gas shutdown.

M9 Standard equipment on CB1700 through CB3080. Electronic pilot supervision, spark ignition. 4 second main gas shutdown.

F3/M3 FM approved system.

F4/M4 IRI (formerly FIA).

F5/M5 Illinois School Code.

F6/M6 Improved Risks Mutual (IRM).

F7/M7 California Code.

F9/M9 Includes spark ignition, electronic pilot supervision, 4 second main gas shutdown.

BURNER MODULATION (OPTIONS A & B)

- A) Boiler shall be module fired to effect peak fuel efficiency. Module firing shall employ dual gas controls, gas valves, and aquastats, with an overriding hi-limit safety control. With aquastat settings a few degrees apart, upon a call for heat, 50% of the boiler input will be fired. Where the demand cannot be met in this mode, the remaining 50% of boiler input shall be fired automatically to reach the full rated input of the boiler. Boiler shall be capable of 100% on/off firing.
- B) Boiler shall have a motor operated modulating gas valve capable of regulating the input rating of the boiler proportionate to the heating demand. Full modulation permits boiler operation from 100% of rated input down to approximately 20% of rated input, in order to effect greater boiler and system efficiency.

NOTE: Module firing systems are available with all firing control packages.



















COMPUTATION SHEET

Σ	Keller	&	Gannon

Engineers-Architects

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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

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Cond Storage Warehouse NA . 105 	167	Officers Quarters Military	¥	•	105	•	•	•	\$0	\$0	\$0	\$0	
Colid Storage Warehouse NA 105 - 50 50 50 50 Technical Library NA - 105 - - 50 50 50 50 Comild Development Cntr 105 110 105 - - 50	8	General Purp Warehouse	ž	•	105	1	•		0\$	0\$	0\$	\$0	•
Technical Library NA . 105 	12	Cold Storage Warehouse	₹	•	105		•		\$0	0\$	\$0	\$0	•
Chilid Development Cntr 105 110 105 110 105 110 105 110 105 110 105 110 105 107	13	Technical Library	ž		105	•	•		\$0	\$0	0\$	\$0	•
Commissary 105 110 105 - - 0.32 \$0 \$0 \$231 \$121 \$122 </td <th>178</th> <th>Child Development Cntr</th> <td>105</td> <td>110</td> <td>105</td> <td>1</td> <td>3.55</td> <td>•</td> <td>0\$</td> <td>\$28</td> <td>\$0</td> <td>\$396</td> <td>\$69.57</td>	178	Child Development Cntr	105	110	105	1	3.55	•	0\$	\$28	\$0	\$396	\$69.57
Sup Svc Admin Bidg 0 105 105 - 105 - 105 - 40 \$0	182	Commissary	105	110	105	•	•	0.32	0\$	0\$	\$20	\$231	\$69.57
Admin Bidg R&D - Office 105 125 105 - 0.67 \$0 \$0 \$42 \$488 Admin Bidg R&D - Office 105 125 105 - - 0.16 \$0 \$0 \$42 \$488 Admin Bidg R&D - Electronics NA - 105 - - 50 \$0 \$0 \$0 \$0 General Inst Bidg NA - 105 - - - \$0 \$0 \$0 \$0 \$0 Admin General Purpose 105 140 105 105 10.49 - \$0 \$0 \$0 \$0 Admin General Purpose 105 140 140 105 105 0.00 \$0 \$0 \$0 \$0 \$0 Acompany HQ Building 140 140 140 0.00 - \$0 \$0 \$0 \$0 Kitchen Area - Scullery 165 145 165 165 160 \$0 \$0	186	Sup Svc Admin Bidg	0	•	105	•		•	\$0	0\$	\$0	\$0	•
Admin Bidg R&D - Office 105 125 105 - - 0.16 \$0 \$10 \$114 - - \$114 -	8	Post Chapel	105	125	105	٠	t	0.67	0\$	0\$	\$42	\$488	\$69.57
Admin Bidg R&D - Electronice NA 105 - + <t< td=""><th>197</th><th>Admin Bidg R&D - Office</th><td>105</td><td>125</td><td>105</td><td>•</td><td>•</td><td>0.16</td><td>0\$</td><td>0\$</td><td>\$10</td><td>\$114</td><td>\$69.57</td></t<>	197	Admin Bidg R&D - Office	105	125	105	•	•	0.16	0\$	0\$	\$10	\$114	\$69.57
Admin General Inst Bidg NA - 105 - - \$0 \$0 \$0 \$0 Admin General Purpose 105 140 105 - - \$52 \$0 \$0 \$720 \$720 A Company HQ Building 105 140 140 140 0.00 - - \$0 \$0 \$15 \$177 Enilsted Pers Dining Fac 140 140 140 0.00 - - \$0 \$0 \$15 \$177 Kitchen Area - Scullery 140 140 140 - - - \$0 \$0 \$0 \$0 Kitchen Area - Scullery 105 145 105 203.31 - - \$1,012 \$0 \$0 \$0 A Company HQ Building 105 145 105 105 50 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 <		Admin Bidg R&D - Electronics	Y.		105	•	•	•	0\$	0\$	\$0	\$0	
Admin General Purpose 105 140 105 10.49 - \$52 \$0 \$70 \$720 A Company HQ Building 105 135 105 - - - - \$0 \$0 \$177 \$177 Enilsted Pers Dining Fac 140 140 140 140 0.00 - - \$0 \$0 \$0 \$0 Kitchen Area - Scullery 140 140 140 - - \$0	198	General Inst Bidg	NA NA	•	105	•	•	-	0\$	\$0	\$0	\$0	
A Company HQ Building 105 135 105 - - 0.24 \$0 \$0 \$177 Enlisted Pers Dining Fac 140 140 140 140 140 140 - - - \$0 \$0 \$0 \$0 \$0 Kitchen Area - Scullery 140 140 140 - - - \$0 \$0 \$0 \$0 \$0 Enl Barracke w/o Dining 105 145 105 203.31 - - \$1,012 \$0 \$0 \$0 \$0 \$0 A Company HQ Building 105 140 105 105 105 \$0<	202		105	1	105	10.49	-		\$52	0\$	\$0	\$720	\$69.57
Enlisted Pers Dining Fac 140 140 140 0.00 - - \$0 \$0 \$0 \$0 Kitchen Area - Scullery 140 180 140 140 140 - - - - 50 \$0 \$0 \$0 Eni Barracke w/o Dining 105 130 105 203.31 - - \$1,012 \$0 \$0 \$13,952 A Company HQ Building 105 145 105 105 105 105 \$0 \$0 \$13,952 Eni Barracke w/o Dining 105 140 105 198.10 - \$987 \$0 \$13,594 A Company HQ Building 105 140 105 105 0.20 \$0 \$0 \$13,594	205A		105	135	105	1	•	0.24	\$0	0\$	\$15	\$177	\$69.57
Kitchen Area - Scullery 140 180 140 140 140 140 140 140 145 105 203.31 - - \$1,012 \$0 \$0 \$13,952 8 A Company HQ Building 105 130 105 105 105 105 105 \$0 \$0 \$13,952 \$0 Eni Barracke w/o Dining 105 140 105 105 106 \$0 \$0 \$0 \$13,594 Company HQ Building 105 140 105 105 105 \$0 \$0 \$13,594 A Company HQ Building 105 140 105 105 \$0 \$0 \$13,594	98	Enlisted Pers Dining Fac	140	1 5	140	0.00	•		0\$	0\$	\$0	\$0	\$69.57
Eni Barracke w/o Dining 105 145 105 203.31 - - \$1,012 \$0 \$1,952 - \$1,012 \$0 \$1,012 \$0 \$1,3952 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - \$1,47 - - \$1,47 - - \$1,47 - - \$1,47 - - - \$1,47 -		Kitchen Area - Scullery	140	2	140	•	•	-	0\$	0\$	0\$	\$0	•
A Company HQ Building 105	2		105	145	105	203.31	•	•	\$1,012	\$0	\$0	\$13,952	\$69.57
Enl Barracks w/o Dining 105 140 105 198.10 - - \$987 \$0 \$13,594 A Company HQ Building 105 140 105 - - 0.28 \$0 \$18 \$206	207A	_	105	130	105	\$	•	0.20	0\$	0\$	\$13	\$147	\$69.57
Company HQ Building 105 140 105 0.28 \$0 \$0 \$18 \$206	88		105	5	105	198.10	-	1	286\$	\$0	0\$	\$13,594	\$69.57
	& 88 88		105	140	105	•	•	0.28	0\$	0\$	\$18	\$206	\$69.57

ECO C-1 Sheet 5of7

Fac		DHW Temper	mperatures	88	FCO C1 En	FCO C1 Energy Sevings						
Š	Installation Name	ECOC		Authorized	Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann	Flec Ann		moetmont
	-	Temp	Temp	Temp	Mil BTU/Yr	MII BTU/Yr MW-Hr/Yr	MW-Hr/Yr	\$ Savings	S Saving	Saving	Savinae	nivestineni.
8 8 8	AAFES Snack Bar	105	145	105	•	•	29.67	S	0\$	\$1 846	\$21 BO	\$60 E7
P 210	Hith/Duti Clinic w/ Beds	140	140	140	00.00	•		\$0	20	80	000	\$69.57
P 211	Outdoor Swimming Pool	¥	NA	105	•	•		\$0	\$0	05	Ç	0.00
P 212	Gymnasium	105	130	105	•	4.63	•	0\$	\$36	80	\$516	\$69.57
P 219	Physical Fitness Center	195	120	105	•	12.26		\$0	96\$	0\$	\$1.366	\$69.57
22.2		- - -	130	105	44.14	•	•	\$220	\$0	\$0	\$3,029	\$69.57
P 229A	_	_ - -	120	105	•	-	0.12	\$0	\$	88	\$88	\$69.57
		<u>გ</u>	1 23	105	122.38	•	•	\$609	\$0	SS SS	\$8,399	\$69.57
A S	_	105	130	105	٠	•	0.20	\$0	S	\$13	\$147	\$69.57
0330	Admin General Purpose	≨	·	105	•	•	•	\$	0\$	80	\$0	•
000	Admin General Purpose	≨	•	105	1	•	•	0\$	0\$	\$0	0\$	
1820	Admin General Purpose	₹		105	•	•	•	0\$	⊗	8	90	•
25.50	Sig Photo Lab	<u>5</u>	22	105	•	2.93	•	S	\$23	S	\$327	\$69.57
	Process	≨	8	•	•	21.55	•	0\$	\$170	\$	\$2.401	\$69.57
7 240	Admin General Purpose	ž		105	•	•	•	Q\$	\$0	0\$	\$0	
3 24	GM Facility	105	- 120	105	1	•	0.29	0\$	0\$	\$18	\$208	\$69.57
		≨		•	•	•	٠	\$0	0\$	\$0	0\$	1
9,0		₹		•	•	•	•	\$0	0\$	S	9	
370	Admin General Purpose	¥	•	105	1	•	٠	\$0	0\$	\$0	0\$	
3244	Admin General Purpose	¥		105	•	-	•	9	\$	\$	0\$	•
0740	Admin General Purpose	∑	•	105	•	٠	٠	\$0	\$0	Ç\$	\$0	
747	Admin General Purpose	∑		105	•	•	•	\$0	0\$	\$	\$0	•
7.252	Venicie Maint Shop DS	105	129	105	•	•	0.66	\$0	\$0	\$	\$481	\$69.57
0020	Volicie Maint Shop Original Volicie	300	135	105	•		0.39	\$0	\$0	\$25	\$287	\$69.57
200	Venicle Maint Shop Ord	105	125	105	•	•	0.88	\$0	0\$	\$55	\$642	\$69.57
3		Ž	•	105	•	•		\$0	\$0	\$0	\$0	•
286	Admin General Duracco	≨ s		•	•	•		\$0	\$0	\$0	\$0	•
D 287	Recreation Building	¥ 5		100	•	•		\$0	\$0	\$0	\$0	•
086	Google Duroco Wordham	3	2	SOL		19.57	•	\$0	\$154	\$0	\$2,181	\$69.57
300	Electron Equila Escilar	Ž		105	1	•	•	S	\$0	\$0	\$0	•
3	Electron Equip racing	202	135	105	•	9.15	•	₩	\$72	\$0	\$1,020	\$69.57
201	Cont Himid Wesehouse	¥ S	1					0\$	\$0	\$0	\$0	
1000	Cal Barrate 11/2 Dist	¥,	•	105	•		•	\$0	0\$	0\$	0\$	•
202	ADD Buildiag	305	128	105		199.34	•	\$0	\$1,569	\$0	\$22,215	\$69.57
3		25	132	105	1	•	0.62	\$0	\$0	\$38	\$450	\$69.57
	•	₹:		•		•	•	\$0	0\$	0\$	0\$	•
		≦	-	1	,	•	•	0\$	♀	S	0\$	•
			•.								•	•

ECO C-1 Sheet 6 of 7

Fac	The state of the s	DHW Te	mperatur		ECO C1 Energy Savings	ergy Savings						
ġ Ż	Installation Name ECO C Actual A	ECO C	Actual	uthorized	Fuel Oil	Propane		FO Ann.	Electric FO Ann. Prop. Ann. Elec. Ann.	Elec. Ann.	227	Investment
	19,2 to 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	Temp	Temp Temp	Temp	Mil BTU/Yr	Mil BTU/Yr Mil BTU/Yr MW-Hr/Yr \$ Savings \$ Savings	MW-Hr/Yr	\$ Savings	\$ Savings	\$ Savings	Savings	
P 642	642 Detached Latrine/Shower	105	130	105	ľ	28.66	1	\$0	\$226	0\$	\$3,194	\$69.57
\$ 2201	S 2201 Control Tower - Range SPT	Ν	•	105	•	•	1	\$0	\$0	\$0	\$0	•
Totals	wit-				8/9	430	88	\$2,881	\$3,388	\$3,632	\$130,157	\$5,009
								UPW x Invest =	est =	\$55,700	SIR =	金井田 13.3
	19 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	EHR	and company	the right of	-							

4

Life Cycle Cost Analysis Summary ECO C-1 Energy Conservation Investment Program (ECIP) Sheet 7 to 7

	Fort Hunter Ligg Reduce DHW Ten ion Name: ECO#	nperatures	Region No. 4		Project No. 16 Fiscal Year FY	403-10 /96
Analysis Date	e: March 1993		Economic Life: 1	5 YEARS	Preparer: KELL	ER & GANNON *
1. Investment A. Constructi B. SIOH C. Design Co D. Total Cost	on Costs		\$5,009 \$275 \$301 \$5,585			
	alue of Existing Ed			\$0 \$0	_	
	ity Company Reba stment (1D-1E-1F)				\$5,585	
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Factor	<u> </u>			
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)	Discount Factor(4)	Discounted Savings(5)	
A. Elec.	\$18.23	199.2	\$3,632	11.70	\$42,496	
B. Dist	\$4.98	578	\$2,881	13.78	\$39,694	
C. Propane	\$7.87	430	\$3,388	14.16	\$47,968	: .
D. Demand	\$108.60	0.0	k \$0=	11.70	\$0 ∌	
E. Other		_				
F. Total			\$9,900		\$130,157	
3. Non Energ	y Savings (+) or (Cost (-):	•			
A. Annual Re	curring (+/-)		(\$5,009)			
(1) Discount I	Factor (Table A)			11.12		
	d Savings/Cost (3			•	(\$55,700)	
B. Non Recui	ring Savings (+)	or Cost (-)				
Item	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Doscounted Sav- ings(+)Cost(-)(4)		
a. ·						
b. 5						
C.					- Marie	
d. Total			· · · · · · · · · · · · · · · · · · ·		_	
C Total Non B	Energy Discounted	I Savings (3A2+3Bd	14)	(\$55,700)		
4. Simple Pay	back 1G/(2F3+3/	+(3Bd1/Economic	Life)):	1.1	Years	- tone Co
	iscounted Saving			\$74,457	,	
	Investment Ratio			13.33		
_	nternal Rate of Ret	• •		87.56%		

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY	JCS	ECO # CZ	PROJECT F	HL SEAP
CHECKED BY_	BELIARY 1993	INSULATE DOMESTIC		03 -10
DATE	19	WATER PIPES	SHEET NO.	OF SHEETS
**			1	
Des	KEIPTION OF	Whek		
	ECITION OF	3	· -	
1	reduce ener	rgy consumption by the	INSTALLATION	OF
Ţ1	usulation on	DOMESTIC HUT WATER PIP	ES,	
				The second special approximation of the second special approximati
EVA	LI UATION "SUN	MARY/APPROACH	· ··	
		-		
•		WATER SYSTEMS FOR TH	ie Purposes	of analysis
C	an be divide	d into two types		The second secon
	1.) . NOW .	- CIRCULATED		
	2) CIRC	WLATED.		
	. Non Circul	ATED SYSTEMS		
	TYPICAL O	F MOST RESIDENCE - LIV	ING TYPE	
·- -	CCUPAK	IES. HOT WATER FROM	THE WATER	
·	HEATER /	TANK SITS, MOITIONLESS, 1	N THE PIPES	
	UNTIL A F	FAUCET OR VALUE IS OPEN	ED. STANDI	VS
	HOT WAT	ER LOSSES HEAT TO TH	HE AMBIENT	
-	AIR AS CH	HARACTERIZED BY THE	POLLOWING	
	EQUATION	, ,		
			<u> </u>	
	T(0)=	To + (Ti-To)e	CT/UT	
	T = TEA	MPERATURE AT TIME IN	(LEMENT A	
				
	To = AM	BIENT TEMPERANEE, AS	SUMED TO BE	55 F
	T. ILLET	TAL TEMPERATURE, TAKE	N TO BE THE	
- "); = MI	V HEATER SET POINT TE		
	0 = ELA	PSED TIME		
`	C- = HEA	T CAPACITY OF WATER	L Bh./-	
	OF - HEAT		- DIE/ F	
	UT = (23 W)	DUCTANCE OF PIPE AN	D INSULATION	IE Assy
	STU	•		

FORM 101-1/8

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY JCS	ECO # C2	PROJECT FHL EEAP
CHECKED BY	INSULATE DOMESTIC HOT	16-403-01
DATE19191919	WATER PIPES	SHEET NO OF SHEETS
112.11	WATER 11163	OF SHEETS

NON-CIRCULATED SYSTEMS CONTINUED.

TEMPERATURE OF DHW STANDING IN PIPES

TO T= To+(Ti-To)e CHUT

BARE I"THICK
PIPE INSULATION

B4 Btv
hr.*F

O TIME

TWO QUESTIONS ARISE: I HOW LONG DOES IT TAKE THE WATER
IN THE PIPE TO COOL TO AN UNACCEPTABLE
LEVEL?

2.) DOES ADDING INSULATION AFFECT THIS TIME SIGNIFICANTLY?

BARE PIPE - TAMBIENT = 55 °F

HOW LONG POES IT TAKE 140°F WATER TO COOL TO BELOW 90%

$$\Theta = -\ln\left(\frac{35}{85}\right) \times \frac{1}{84} = 0.11 \text{ hrs} = 6.6 \text{ minutes}$$

INSULATED PIPE

$$\Theta = -\ln\left(\frac{35}{85}\right) \times \frac{1}{1.5} = 0.59 \text{ hrs} = 35 \text{ minutes}$$

THUS, IF THE WATER PEMAND IS NO MORE FREQUENT
THAN EVERY 1/2 HOUR, THEN INSULATION MAKES NO DIFFERENCE

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

	COMPUTED BY	JCS_	ECO #CZ	PROJECT_		AP
	CHECKED BY	1011 00		FSTY 6-40	3-10	
	DATE FEBRU	19 23	HOT WATER PIPE		OF	SHEETS
	NLV.		HOT WATCH IT			
	, <u>2</u>		ومسود مست مدينيي. رومود د سدامات			
	2 6	CIRCULATE	D HOT WATER SY	STEMS		
			and the second second second second second second			
			- CONTINUOUSLY CIR			
	1	HROUGH T	HE PIPING SYSTEM.	THE WATER		
			ZE IS MAINTAINED A			
			er set foint temp			
			STEADY - STATE UN	ILIKE NON-CIRCULA	TED_	
	=	systems.				
		.)				
			haulations for circ		EAT	
		osses foi	LLOW THIS NARRAT	`V€		
	- ·					
		THE FIELD	INVESTIGATION VIELT	DED THE DESERV	ATON.	
		THAT MOST	PIPES HAD INSULA"	1704 AND ONLY SO	ME:	
		REQUIRED				
		:				
			y of Energy saying	•		
	1 '		DIRED WISULATION R	epair follows	THIS_	
		NARBATIVE	The second of th			
	The state of the s					
		P- AC-IM	PLEMENTATION			
	ORDE	C OF IN	/ CENIEN / TIPON			
			ALC: AND EXA ACC			
		•	He 12 NO ECO ASS	UMED 10 BE	1 (1	
	IN	IPLEMENTE	D			
			er klauser von minn gefonde sekrendingspronnen minnen in op harp deken frontlige i en die bei			
**						
FORM 101-1/8						
FORM 101-1/8						

ECO-C2 INSTALL PIPE INSULATION IN CIRCULATED HOT WATER SYSTEMS

Analysis of Circulated Domestic Hot Water Energy Savings

				# 001	ECC #2 Energy Savings	avings					
9	DHW	Pipe Loss	Pipe Loss	Fuel Oil	Propane	Electric	FO Ann	Prop App	Prop. Appl Floor Appl	XX	100000000000000000000000000000000000000
	Temp	MII BTU/Y	MII BTU/Yr	MII BTUM	_	MIRTIN	Savino	Cavingo	FIGURE ATTEN	2	HIVESTILIERIT
22	105	10.8	404		c		SE INTO	a cavings a cavings	a cavings	Savings	
*	077	900	200			•	Og.	20	\$0	000	₩
ŀ		0.0	16.8	•	0	•	\$	\$	0\$	Ç	Ç
202	140	42.4	42.4	0			\$0	Ç	Ç	9	8
200	140	74.0	74.0	0			S	3	9	9	9 6
207	105	55,5	424	13.1			204	3	Q.	O	O _P
a S	405	7 22	i				C00	20	20	\$899	\$100
3 8		000	S.C	2.5	•	•	\$12	8	\$0	\$172	\$100
3	105	46.5	35.5	11.0		,	\$55	Ş	Ş	€7EE	20
230	105	45.9	34.9	11.0			CAR.		9	0019	0010
S 238	105	193	000		67		3	3	2	6/22	301
200	200		2,5		?		O#	\$52	8	\$780	09 \$
,	2	4.2	0.0	•	7.9		\$	29 \$	\$0	\$880	\$60
7											
		A	otals	37.6	14.9		\$187	\$117	0\$	54 941	\$K00

CONSTRUCTION COST ES	TINANT	re'		Date Prepared	1002	Sheet Of	
	IIIVIAI			February			
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate	
Location Location		*···			Code A	(no design comp	eted)
Fort Hunter-Liggett, California				 	1		
Engineer-Architect Keller & Gannon							
Drawing No.		Estimate	or	 	Checked	Ву	
ECO-C2 Install Pipe Insulation					ļ		
Line Item	No.	antity Unit	Per	Labor	Per	Aaterial	Total
	Units	Meas.	Unit	Total	Unit	Total	Cost
Bldg. 207, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
		-		100	, , , ,	7.0	V 10.
Bldg. 208, F/g inusl. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
Bldg. 229, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
	 						
Bldg. 230, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
Rida 239 E/a input for 18 pino	10	LF	Ġ.A	\$40	**	600	
Bldg. 238, F/g insul. for 1" pipe	10	LF	\$4	\$40	\$2	\$20	\$60
Bldg. 290, F/g insul. for 1" pipe	10	I F	\$4	\$40	\$2	\$20	\$60
g, -/-g				4.0	42	420	400
•							
	1						
							-
	1						
	+						-
	1						
Subtotal							\$520
Sales Tax @ 8%							\$42
Subtotal							\$562
Contractor OH & Profit @ 30%							\$168
Subtotal							\$730
Bond @ 1%							\$7
Subtotal	 						\$737
Estimating Contingency @ 10%	1						\$74
Total Probable Construction Cost	 		\longrightarrow				\$811

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title:		igett, California LL PIPE INSULATIO	Region No. 4		Project No. 16 Fiscal Year F	5-403-10 Y96
Discrete Por	tion Name:	Bidgs. 127, 197	, 212, 240 & 301			
Analysis Dat	te: March 1993		Economic Life:	15 YEARS	Preparer: KELI	ER & GANNON
1. Investmer	nt Costs					
A. Construct	ion Costs		\$811	•		
B. SIOH			\$45	•		
C. Design C	ost		\$0	•		
D. Total Cos	t (1A+1B+1C)		\$856			
E. Salvage V	alue of Existing E	quipment		\$0 -		
F. Public Uti	lity Company Reb	ate ·		\$0		
G. Total Inve	estment (1D-1E-1F	7)			\$856	
2. Energy Sa	avings (+)/Cost(-)	•				
		d for Discount Facto	ors	•		
Energy	Cost	Saving	Annual \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec.	\$18.23	0 ÷	\$0.7	11.70	\$0	
B. Dist	\$4.98	48	\$240	13.78	\$3,308	
C. Propane	\$7.87	15 .	\$117	14.16	\$1,660	
D. Other	NA	0	- \$0 <i>₽</i> .	NA	NA.	
E. Demand S	avings		- \$0 5	11.70	\$0 #	
F. Total		⊗ ≆	\$357		\$4,968	et in
3. Non Energ	y Savings (+) or	Cost (-):		<u></u>		
A. Annual Re	curring (+/-)		\$0≆			
	Factor (Table A)			11.12		
(2) Discounte	ed Savings/Cost (3A x 3A1)	•		\$02	
		• • • • • • • • • • • • • • • • • • •	21 L.S.			
B. Non Recu	rring Savings (+)	or Cost (-)	•			
ltem	Savings(+)	Year of	Discount :	Doscounted Sav-	·*	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	they in the	ý
a. 5	\$07	15 ≉	0.56	\$07		
b.≄.	\$0.≆	15 %	0.56.≛	\$0 -	Territoria	5
C. ~	\$0 :	15 -	0.56 ℃	\$0		er en en en en en en en en en en en en en
d. Total 🛎	\$ 0	0	0.00	\$0		
C Total Non B	Energy Discounted	d Savings (3A2+3B	14)	\$0 ≇		
4. Simple Pav	back 1G/(2F3+3/	A+(3Bd1/Economic	Life)):	. 24 à	Years :	
	iscounted Saving			\$4,968		
	Investment Ratio			5.81		

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY JCS	ECO	[±] C3	PROJECT FHL EEAP
CHECKED BY	INSULATE	HOT WATER	10-403-10
REV 19	STORAGE	TANKS	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE ENERGY CONSOMPTION BY INSULATING HOT WATER STORAGE TANKS.

EVALUATION SUMMARY / APPROACH

HEAT LOSSES FROM HOT WATER TANKS WERE ESTIMATED USING GUIDANCE FROM "ARCHITECTS & ENGINEERS GUIDE TO ENERGY CONSERVATION IN EXISTING BUILDINGS," PUBLISHED BY THE US DEPT. OF ENERGY. THE GUIDE WAS USED TO ESTIMATE BASELINE AND REDUCED HEAT LOSSES. THE TWO WERE COMPARED TO PETERMINE ENERGY GAUINGS.

ORDER OF IMPLEMENTATION

THIS OPPORTUNITY WAS ASSUMED TO BE THE SELOWD TO BE IMPLEMENTED

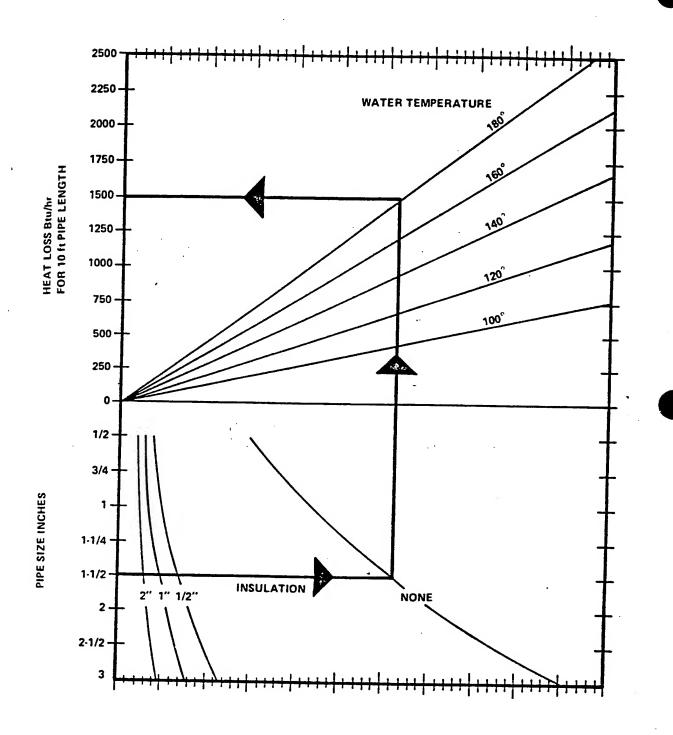


FIGURE 8-47. HEATING-HEAT LOSS FOR VARIOUS PIPE SIZES, INSULATION THICKNESS, AND WATER TEMPERATURES FROM 100°F TO 180°F

DOMESTIC HOT WATER TANK INSULATION LOSSES:

Insulation Thickness	Tank	IBTUH Losses a	t Water Temper	atures					
(k = 0.3)	Gallons	100 Deg F	120 Deg F	122 Deg F	128 Deg F	135 Deg F	140 Deg F	160 Deg F	180 Deg F
	6	519	863	897	1,001	1,121	1,207	1,634	2,060
	20	768	1,277	1,327	1,480	1,658	1,785	2,407	3,028
•	40	1,123	1,867	1,941	2,165	2,425	2,611	3,510	4,409
	50	1,301	2,163	2,249	2,507	2,809	3,024	4,062	5,100
	52	1,337	2.222	2,311	2,576	2,886	3,107	4,173	5,238
	69	1,639	2,724	2,833	3,158	3,538	3,809	5,111	6,413
Bare	80	1,834	3,049	3,170	3,534	3,959	4,263	5,718	7,172
	83	1,888	3,138	3,262	3,637	4,075	4,387	5,884	7,380
	100	2,190	3,640	3,784	4,219	4,727	5,089	6,822	8,554
	125	2,465	4,097	4,260	4,749	5,320	5,728	7,682	9,637
	250	3,840	6,382	6,636	7,398	8,288	8,923	11,987	15,051
	500	6,292	10,456	10,872	12,122	13,579	14,620	19,640	24,680
	850	9,725	16,160	16,804	18,735	20,987	22,596	30,354	38,113
	1,700	18,062	30,014	31,209	34,794	38,978	41,966	56,374	70,783
	6	83	129	134	147	164	175	223	270
	20	122	191	198	219	243	260	330	400
	40	178	280	290	320	356	381	483	585
	42	184	289	299	330	367	393	499	604
	50	206	324	335	371	412	441	560	678
	52	212	333	345	381	423	453	575	697
	69	259	408	422	467	519	556	705	854
1-inch Thick	80	290	456	473	522	581	622	789	956
THINT FINA	82	296	465	482	533	592	634	805	975
	100	346	545	564	624	693	743	943	1,142
	125	390	613	635	702	780	836	1,061	1,285
	250	607	955	990	1,094	1,216	1,303	1,653	2.002
	500	994	1,565	1,622	1,793	1,992	2,135	2,708	3,280
	850	1,536	2,418	2,506	2,771	3,079	3,300	4,185	5,069
	1,700	2,852	4,490	4,654	5,148	5,719	6,129	7,772	9,414
	50	109	173	179	198	220	236	299	362
2-inch Thick	100	184	291	301	333	370	397	503	609
Z-IROH HIROK	250	323	510	528	584	649	696	883	1,069
	500	528	834	865	956	1,064	1,140	1,446	1,751
	6	29	46	48	53	59	63	81	98
	15	40	63	65	73	81	86	110	133
	20	43	69	71	79	88	94	120	145
	40	64	101	105	116	129	138	175	212
	42	66	104	108	119	133	142	180	218
	50	74	117	121	134	149	160	203	245
	50 52	76	120	121	138	153	164	203	
									252
O in als Thirt	69	93	148	153	169	188	202	255	306
3-inch Thick	80	105	166	172	190	211	226	286	345
	83	108	171	177	196	217	233	294	
	100	125	198	205	227	252	270	341	412
	125	141	222	230	255	283	304	384	
4	250	219	346	359	397	441	473	598 -	
	500	359	567	588	650	723	775	980 4	-,
	850	555	876	909	1,005	1,117	1,198	1,514	1,831
	1,075	681	1,075	1,115	1,233	1,370	1,470	1,857	2,247

Source: Architects and Engineers Guide to Energy Conservation in Existing Buildings, February 1980, U.S. DOE.

ECO # C3

Assumptions:

- Existing Hot Water Heater tanks that do not have insulation blankets are assumed to have the equivalent of 1-inch thick insulation.
- 2. Installation of an insulation jacket will provide the equivalent of 3-inch thick insulation.
- 3. Heat losses are in addition to those included in "Efficiency" calulation under "Convection Losses".
- 4. Unless controlled by time clock or othet means, losses are assumed to be continuous, 8,760 Hours per year.

DOMESTIC HOT WATER TANK INSULATION

Deathailte e Nove I			Existing Cor	ndtion	Proposed C	ondtion	Heat Loss
Building Number	Tank	Existing	Tank Instrn	Heat Loss	Tank Insttn	Heat Loss	Load Saved
	Gallons	Temp Deg F	Inches	Mil BTU/Yr	Inches	Mil BTU/Yr	Mil BTU/Yr
6	40	135	1	3.1	3	2.5	0.6
80	80	135	1	5.1	3	1.8	3.3
81	20 & 40	135	1	5.2	3	1.9	3.3
101	100	160	1	8.3	3	3.0	5.3
101.1	40	140	1	3.3	3	1.2	2.1
101.2	83	140	1	5.6	3	2.0	3.6
120	100	110	1	3.9	3	1.4	2.5
120.1	100	140	. 1	6.5	3	2.4	4.1
124	40	160	1	4.2	3	1.5	2.7
127	100	128	1	5.5	3	2.0	3.5
131	40	135	1	3.1	3	1.1	
144	69	Not used	i	0.0	3		2.0
149	40	135	•	3.1	3	0.0	0.0
197	6	128	;	1.3		1.1	2.0
206	2 x 850	140		57.8	3	0.5	0.8
210	100	140			3	21.0	36.8
219	80	120		6.5	3	2.4	4.1
238	125	122		4.0	3	1.5	2.5
252	52	120	1	5.6	3	2.0	3.6
287	40	140	1	2.9	3	1.1	1.8
290	100		1	3.3	3	1.2	2.1
230	100	135	1	6.1	3	2.2	3.9

Assumptions:

- 1. Existing Hot Water Heater tanks that do not have insulation blankets are assumed to have the equivalent of 1-inch thick insulation.
- 2. Installation of an insulation jacket will provide the equivalent of 3-inch thick insulation.
- 3. Heat losses are in addition to those included in "Efficiency" calulation under "Convection Losses".
- 4. Unless controlled by time clock or other means, losses are assumed to be continuous, 8,760 Hours per year.

DOMESTIC HOT WATER TANK INSULATION

		JIOI WAILI	Existing Cor	ndtion	Proposed C	ondtion	Heat Loss
Building Number	Tank	Existing	Tank insttn	Heat Loss	Tank insltn	Heat Loss	Load Saved
_	Gallons	Temp Deg F	Inches	Mil BTU/Yr	Inches	Mil BTU/Yr	Mil BTU/Yr
6	40	135	1	3.1	3	2.5	0.6
80	80	135	1	5.1	3	1.8	3.3
81	20 & 40	135	1	5.2	3	1.9	3.3
101	100	160	1	8.3	3	3.0	5.3
101.1	40	140	1	3.3	3	1.2	2.1
101.2	83	140	1	5.6	3	2.0	3.6
120	100	110	1	3.9	3	1.4	2.5
120.1	100	140	1	6.5	3	2.4	4.1
124	40	160	1	4.2	3	1.5	2.7
127	100	128	1	5.5	3	2.0	3.5
131	40	135	1	3.1	3	1.1	2.0
144	69	Not used	1	0.0	3	0.0	0.0
149	40	135	1	3.1	3	1.1	2.0
197	. 6	128	1	1.3	3	0.5	0.8
206	2 x 850	140	1	57.8	3	21.0	36.8
210	100	140	1	6.5	3	2.4	4.1
219	80	120	1	4.0	3	1.5	2.5
238	125	122	1	5.6	3	2.0	3.6
252	52	120	1	2.9	3	1.1	1.8
287	40	140	1	3.3	3	1.2	2.1
290	100	135	1	6.1	3	2.2	3.9

ECO-C3 INSULATE HOT WATER HEATERS

Fac		Existing Condition	ECO - C3	ECO - C3 Energy Savings	Ø						
ġ.		Tank Insitn Heat Loss	Tank Instin	Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann	Elec. Ann	227	Investment
	Inches	MII BTU/Yr	Inches	Mil BTU/Yr	MII BTU/Y	MII BTU/Y	\$ Savings	\$ Savings	\$ Savings	Savings	
9	1	3.1			3.6		\$0	\$28	0\$	\$398	\$75
P 80	1	5.1	င	•	•	1.8	\$0	\$0	\$33	\$384	\$75
P 81	1	5.2	က	•	-	1.9	\$0	0\$	\$35	\$405	\$75
P 101	-	8.3	3	•	4.3		0\$	\$34	0\$	\$478	\$100
	1	3.3	က	•	1.7		0\$	\$13	\$0	\$191	\$75
	-	5.6	ဇ	•	2.9		0\$	\$22	\$0	\$318	\$75
120	-	3.9	က	•	1.9	ı	0\$	\$15	\$0	\$207	\$100
:. 	-	6.5	က	•	3.4	•	0\$	\$27	0\$	\$382	\$100
124	-	4.2	က	•	2.1		0\$	\$17	0\$	\$239	\$75
121	1	5.5	င		2.9	•	0\$	\$22	0\$	\$318	\$100
131	1	3.1	က	•	1.6	•	\$0	\$12	\$0	\$175	\$75
S 144	1	0		•	•	•	0\$	0\$	\$0	0\$	0\$
149	1	3.1	3	•	1.6		0\$	\$12	\$0	\$115	\$75
S 197	-	1.3	က		٠	0.5	0\$	0\$	6 \$	\$107	\$75
P 206	-	57.8	က	24.2	•	•	\$120	0\$	\$0	\$1,660	\$1,560
P 210	1	6.5	င	3.4		•	\$17	\$0	\$0	\$232	\$100
P 219	1	4.0	င	•	2.0		0\$	\$16	\$0	\$220	\$75
S 238	1	2.6	3	•	2.5	•	0\$	\$20	\$0	\$278	\$100
P 252	1	2.9	3	•	•	1.1	0\$	\$0	\$20	\$235	\$75
P 287	1	3.3	3	•	1.6	•	0\$	\$13	0\$	\$183	\$75
S 290	1	6.1	3	•	3.1	•	0\$	\$25	\$0	\$348	\$100
			Totals	27.6	35.1	5.3	\$138	\$276	26\$	966'9\$	\$3,160

CONSTRUCTION COST EST	FIRAAT	· <u>-</u>		Date Prepared Sheet Of February 1993			
CONSTRUCTION COST EST	IIIVIAI	<u></u>					
Project				Project No.	Basis for Estimate		
EEAP Limited Energy Study Location				Code A (no design competed)			
						(1.0 d.o.)	
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon							
Drawing No.		Estimate	or		Checked	Ву	
ECO-C3 Insulate DHW Heaters		uantity Labor		ļ,	Material T		
Line Item	No.	Unit	Per	1	Per		Total
	Units	Meas.	Unit	Total	Unit	Total	Cost
	 	-	604	#49	\$13	\$25	\$75
< 80 Gal. DHW Heater insulation kit	1 2	EA	\$24	\$48	\$13	\$25	Ψ/3
fiberglass 1 1/2" Thick	+				 		
Tailand Online	11				-		\$825
Typical for 13 others	111	-	-	-	 - -	 	ΨΟΖΟ
> 80 Gal. DHW Heater	7	EA	\$65	\$455	\$35	\$245	\$700
> 80 Gai. Driv reater	 	LA	\$00	ψ-33	400	V2-10	4,00
850 Gal. Tank Insulated w/ 3" CaSil	2	EA	\$455	\$910	\$325	\$650	\$1,560
650 Gai. Tarik Misulated W/ 5 Casil	 	LA_	\$455	Ψ310	QUEO	4000	Ψ1,000
			 				
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	-	-				 	
		-				 	- ,
			<u> </u>				
	-	 -				 	
					 		
	+	-			 	 	
Subtotal	+		 				\$3,160
Sales Tax @ 8%	+	-	 			 	\$253
Subtotal	+						\$3,413
Contractor OH & Profit @ 30%	+						\$1,024
Subtotal	 	 	<u> </u>		-		\$4,437
Sond @ 1%	+	-	 		 		\$44
Subtotal	 		 			 	\$4,481
Estimating Contingency @ 10%	+		 		 		\$448
Total Probable Construction Cost	-	-				1	\$4,929
TOTAL PRODUCE CONSTRUCTION COST	 	 	ļ			 	ψ 7 ,323

.

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title: Discrete Porti		ett, California L TANK INSULATION	Region No. 4 Economic Life:	15	YEARS	Project No. 16-403-10 Fiscal Year FY96 Preparer: KELLER & GANNON
raidayoio Date	. 141020111000		20011011110 2.101			
1. Investment	Costs					
A. Constructi	on Costs		\$3,160	_		
B. SIOH			\$174	_		
C. Design Co	st		\$0			
D. Total Cost	(1A+1B+1C)		\$3,334	•		
E. Salvage Va	alue of Existing Equ	uipment			\$0	
	ty Company Rebat	e			\$0	
G. Total Inves	stment (1D-1E-1F)					\$3,334
2. Energy Sa	vings (+)/Cost(-):					
		for Discount Factors		_		
Energy	Coat	Savina.	Annual \$		Discount	Discounted
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
Source	φ/W11 BO/(1) _.	MIDTO/TH(2)	Gavings(G)		1 4001(4)	Cavings(o)
A. Elec.	\$18.23	5	\$97		11.70	\$1,130
B. Dist	\$4.98	28	\$137		13.78	\$1,894
C. Propane	\$7.87	35	\$275		14.16	\$3,900
D. Other	NA	0	\$0		NA	NA
E. Demand S	avings		\$0		11.70	\$0
F. Total	•	68	\$510	•		\$6,925
0 No. 5	0 da ua (1) au 0	4 4 3 .				
3. Non Energ	y Savings (+) or C	ost (-):		-		
A. Annual Re	curring (+/-)		\$0			
	Factor (Table A)			-	11.12	
(2) Discounte	d Savings/Cost (3/	A x 3A1)				\$0
D. Mari Danie		. 0 1 ()				
B. Non Recur	ring Savings (+) o	r Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.	\$0	15	0.56		\$0	
b.	\$0	15	0.56		\$0	
C.	\$0	15	0.56		\$0	
d. Total	\$0	0	0.00		\$0	
C Total Non E	Energy Discounted	Savings (3A2+3Bd4)		\$0	
4 Simple Day	hack 16//050±04	+(3Bd1/Economic Li	fo)):		6.5	Years
	iscounted Savings		iej).		\$6,925	i cai 3
	Investment Ratio (2.08	
	itemal Rate of Retu				13%	
rajusteu II		(<i>-</i> 17.			1378	

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY JCS	ECO # C4	PROJECT FHL EEAP
DATE FEBRUARY 1993	ELECTRIC IGNITORS FOR	10-405-10
REV19	GAS HOT WATER HEATERS	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE GAS CONSUMPTION BY ELIMINATING CONTINUOUSLY BURNING GAS PILOT LIGHT IN DOMESTIC HOT WATER HEATERS. INSTALL ELECTRIC PILOT INGUITORS TO FIRE WATER HEATERS.

EVALUATION SUMMARY / APPROACH

EVEN WELL INSULATED HOT WATER HEATERS HAVE HEAT LOSSES. CONTINUOUSLY BURNING GAS PILOT LIGHTS SERVE TO OFFSET TANK LOSSES, PREVENTING THE HEATER FROM CYCLING ON & OFF TO MAINTAIN THE WATER TEMPERATURE. ELECTRIC PILOT LIGHTS PROVIDE NO HEAT TO OFFSET TANK HEAT LOSSES, CAUSING THE HEATER TOI CYCLE ON AND OFF TO MAINTAIN THE SET FOINT WATER TEMPERATURE. THE REDUCTION IN HEATER LIFE AS RESULT OF THIS CYCLING WOULD GREATLY OFFSET OR ELIMINATE ANY COST SAVINGS DUE TO REDUCED GAS CONSUMPTION.

THIS OPPORTUNITY SHOULD NOT BE IMPLEMENTED

ORDER OF IMPLEMENTATION

THIS OPPORTUNITY WAS ASSUMED NOT TO BE IMPLEMENTED.

COMPUTATION SHEET

Σ	Keller	&	Gannon
	Enginee	rs-	-Architects

COMPUTED BY	eco [±] C5	PROJECT FHL EEAP
CHECKED BY	REDUCE POMESTIC HOT	16-403-10
-:	WATER USE AT THE FAUCET	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE HOT WATER USAGE BY THE INSTALLATION OF METERING OR SENSOR OPERATED LAVATORY FAIRETS AND SHOWER HEADS.

EVALUATION SUMMARY / APPROACH

HOT WATER CONSUMPTION CAN BE REDUCED BECAUSE FAUCETS CANNOT BE LEFT OPEN, RUNNING CONTINUOUSLY.

METERING FAUCETS ALLOW WATER FLOW FOR LIMITED PERIODS THEN THE VALVE CLOSES UNTIL THE LEVER IS DEPRESSED AGAIN.

SENSOR OPERATED LAVATORY FAKETS ONLY PERMIT WATER FLOW IF A SENSOR PERCEIVES A PERSON'S HANDS INSIDE THE LAVATORY BOWL.

ALTHOUGH CATALOG LITERATURE CLAIMS INSTALLATION OF SAID VALVES WOULD REDUCE WATER CONSUMPTION BY 80%, IT WAS MORE CONSERVATIVELY ASSUMED TO RESULT IN A 50% REDUCTION IN WATER CONSUMPTION.

THUS THE WATER SAVINGS WAS POUND BY:

OF FLOW RESTRICTING SHOWER HEADS AND LAUGIORY FAUCET INSERTS

ORDER OF IMPLEMENTATION

THE INSTALLATION OF FLOW RESTRICTORS WAS ASSUMED TO BE THE THIRD OPPORTUNITY IMPLEMENTED.

SPEAKMAN EASY-PUSH®





NEW5-4141

Metering Lavatory 15min to install Centerset NEW Combinations

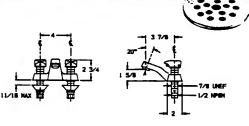
☐ S-4131

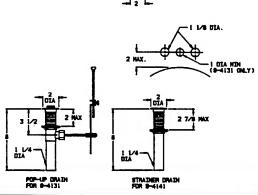
Speakman Polished Chrome Plated EASY-PUSH 4" Centerset Metering Lavatory Combination. Color-coded EASY-PUSH handles with brass yokes. Concealed cycle adjustment without shutting off water supply. 1½" P.O. pop-up drain. Nonhammering operating units protected by monel mesh screens. Vandal-resistant standard. Water conserving, vandal-resistant flow control device reduces flow to a maximum of 3.0 gpm at 80 pounds flow pressure.

☐ S-4141

Speakman Polished Chrome Plated EASY-PUSH 4" Centerset Metering Lavatory Combination. Color-coded EASY-PUSH handles with brass yokes. Concealed cycle adjustment without shutting off water supply. 1½" P.O. strainer drain. Nonhammering operating units protected by monel mesh screens. Vandal-resistant standard. Water conserving, vandal-resistant flow control device reduces flow to a maximum of 3.0 gpm at 80 pounds flow pressure.

OPTIONS





SUFFIX	DESCRIPTION
□ BOCA/FLO	Vandal-Resistant 0.5 gpm Flow Regulator
□ BH	Brass Handles
□ LD	Less Drain Assembly
□ PALM	Palm Buttons (not handicapped approved)



NOTE: Inlets are sized for either coupling or sweat connections. All dimensions are in inches and are subject to change without notice.

This space for Architect/Engineer approval.

EASY-PUSH® - Registered T.M. Speakman Company

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SPEAKMAN

The Quality Leader Since 1869 P.O. Box 191, Wilmington, DE 19899-0191 1-302/764-9100, FAX: 1-302/764-1956

3.0 gpm flow control device meets ANSI A112.18.1, 1989 Standard.

C5 ECO-4 DOMESTIC HOT WATER SYSTEM SUMMARY

FLOW RESTRICTING SHOWER HEAD AND LAVATORY FAUCET RETROFIT

Non Lo-Flow Devices:

Lo-Flow Devices:

Shower Heads

5.00 gpm

2.00 gpm

Faucets

3.00 gpm

0.75 gpm

Function Code 1:

Offices

2.00 GPCD

Assume use from faucets 75% and by Janitor 25%.

Usage with Lo-Flow faucet aspirators:

1.10 GPCD

Function Code 2: Shops & Warehouses

5.00 GPCD

Assume use from faucets 50% of total usage.

Usage with Lo-Flow faucet aspirators:

3.50 GPCD

Function Code 2.1: Commercial Laundries - Not Applicable to this ECO.

Function Code 3: Barracks & Quarters w/o Dining

30.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	19.50	7.80
Faucets	4.50	1.13
Clothes Washing	6.00	6.00
Total	30.00	14.93

Function Code 3.1: Detatched Latrine with Bathing

25.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	19.50	7.80
Faucets	4.50	1.13
Clothes Washing	0.00	0.00
Total	24.00	8.93

Function Code 4: Barracks & Quarters with Dining

30.00 GPCD

Same as Function Code 3 for non-cooking hot water usage:

14.93 GPCD

Function Code 5: Recreation & Gyms w/o Bathing

0.50 GPCD

Assume use from faucets 50% of total usage.

Usage with Lo-Flow faucet aspirators:

0.35 GPCD

CS ECO-GO DOMESTIC HOT WATER SYSTEM SUMMARY

Function Code 5.1: Recreation & Gyms with Bathing

12.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	10.50	4.20
Faucets	1.50	0.38
Clothes Washing	0.00	0.00
Total	12.00	4.58

ECO - C5 Installation of Self-Metering Faucets

Fac	Domestic	Hot Water H	Domestic Hot Water Heating System	ECO C5 Energy Savings	gy Savings		
Š	Fuel	System	Capacity	Fuel Oil	Propane	Electric	Elect. Ar
	Used	Temp.	BTUH	Mil BTU/Yr	Mil BTU/Y	Mil BTU/Y	\$ Saving
182	Electric	110	240,000	•	-	0.7	\$
197	Electric	125	240,000	•	1	3.6	\$
212	Electric	130	1,875,000	•	•	8.8	\$1
240	None	0	1,875,000	•	-	1	•
301	Electric	132	1,875,000			20.1	\$3(

-	Æ	-						_		-
	Investment		\$720	\$720	\$1,440	1	\$720		\$3,600	
	၁၁၂	Savings	\$181	\$929	\$2,272	-	\$5,189		\$3,382	
	Elect. Ann	\$ Savings	\$13	99\$	\$160	•	998\$		623\$	
	Electric	Mil BTU/Y	0.7	3.6	8.8	•	20.1		33.2	
gy Savings	Propane	Mil BTU/Y	•	•	•	-				
ECO C5 Energy Savings	Fuel Oil	Mil BTU/Yr	•	•	•	•	•		•	

CONSTRUCTION COST ES	TIMAT	Έ		Prepared Sheet Of February 1993			
Project EEAP Limited Energy Study				Project No.	Basis for Estimate		
Fort Hunter-Liggett, California Engineer-Architect					Code A	(no design comp	eted)
Keller & Gannon					ł		
Drawing No.		Estimato	or	***************************************	Checked	By	
ECO-C5 Install Flow Metering Faucets	}				Oncorda by		
	Qu	antity		Labor		Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Self-Metering Lav. Faucets	15	EA	\$40	\$600	\$200	\$3,000	\$3,600
					<u> </u>		
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	1						
Subtotal							\$3,600
Sales Tax @ 8%							\$288
Subtotal							\$3,888
Contractor OH & Profit @ 30%							\$1,166
Subtotal							\$5,054
Bond @ 1%							\$51
Subtotal							\$5,105
Estimating Contingency @ 10%							\$510
Total Probable Construction Cost							\$5,615

Life Cycle Cost Analysis Summary **Energy Conservation Investment Program (ECIP)**

					Declaration 40 400 40
Location: Project Title:	_	gett, California netering faucets	Region No. 4		Project No. 16-403-10 Fiscal Year FY96
Discrete Por	tion Name:	Bldgs. 182, 197	, 212, 240 & 301		
Analysis Dat	te: March 1993		Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investmer	nt Costs			_	
A. Construct	tion Costs		\$5,615	_	
B. SIOH			\$309	_	
C. Design C			\$337	_	
	st (1A+1B+1C)		\$6,261	40	
•	/alue of Existing E	• •		\$0	<u> </u>
	lity Company Reb			\$0	 \$6,261
G. Total inve	estment (1D-1E-1F	·)			φυ,201
2. Energy Sa	avings (+)/Cost(-)	:			
		d for Discount Facto	ors	-	
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$18.23	33	\$605	11.70	\$7,081
B. Dist	\$4.98	0	\$0	13.78	\$0
C. Propane	\$7.87	0	\$0	14.16	\$0
D. Other	NA	0	\$0	NA	NA
E. Demand S	Savings		\$0	11.70	\$0
F. Total		33	\$605		\$7,081
3. Non Energ	gy Savings (+) or	Cost (-):		-	
A. Annual Re	ecurring (+/-)		\$0	_	
	Factor (Table A)			11.12	
(2) Discount	ed Savings/Cost (3A x 3A1)			\$0
B. Non Recu	ırring Savings (+)	or Cost (-)			
Item	Savings(+)	Year of	Discount	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
a.	\$0	15	0.56	\$0	•
b.	\$0	15	0.56	\$0	
C.	\$0	15	0.56	\$0	
d. Total	\$0	0	0.00	\$0	
C Total Non	Energy Discounte	d Savings (3A2+3B	d4)	\$0	
4. Simple Pa	yback 1G/(2F3+3	A+(3Bd1/Economic	: Life)):	10.3	Years
	Discounted Saving			\$7,081	
	Investment Ratio			1.13	
7. Adjusted I	internal Rate of Re	eturn (AIRR):		5.04%	

ECO-C5 REDUCTION IN DOMESTIC HOT WATER CONSUMPTION

Analysis of the Effect of Installation of Flow Restricting Faucets/Shower Heads on Domestic Hot Water Energy Savings

Bldg.	Domestic	lot Water F	Domestic Hot Water Heating System
Š	Fuel	System	Capacity
	Used	Temp.	ВТОН
127	Propane	110	240,000
197	Electric	125	1.25 kW

ECO C5 Energy Savings	rgy Savings				
Propane	Electric	Prop. Ann	Prop. Ann Elect. Ann	<u> </u>	Investment
Mil BTU/Yr	Mil BTU/Y \$ Savings \$ Savings	\$ Savings	\$ Savings	Savings	
2.1	•	\$17	-	\$239	\$135
	12.8	٠	\$233	\$2,730	\$140
2.1	12.8	215	\$233	\$2,969	\$275

CONSTRUCTION COST ES	TIMAT	Έ		Pebruary	Sheet Of		
Project EEAP Limited Energy Study	····			Project No. Basis for Estimate			
Fort Hunter-Liggett, California					Code A	(no design compe	ted)
Engineer-Architect			· · · · · · · · · · · · · · · · · · ·		1		
Keller & Gannon							
Drawing No.		Estimato	r		Checked	Ву	
ECO-C5 Install Flow Restrictors	I Qu	antity		Labor	 	Actorial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Bldg. 127 Lavatory Flow Restrictors	1	LS	•	\$25	-	\$45	\$70
Bldg. 127 Shower Flow Restrictors	1	LS	•	\$25		\$40	\$6
Bldg. 127 Shower Flow Restrictors	- 	-		425	 	7.0	
Bldg. 197 Lavatory Flow Restrictors	1	LS	•	\$25	-	\$30	\$5
Bldg. 197 Shower Flow Restrictors	1	LS	•	\$25		\$60	\$8
	-						
	-						
Subtotal			·				\$27
Sales Tax @ 8%	-						\$2
Subtotal Subtraction Control Control	1						\$29
Contractor OH & Profit @ 30%							\$8 \$38
Subtotal						-	<u>\$36</u>
Bond @ 1%	-	 					\$39
Subtotal	+						\$39
Estimating Contingency @ 10% Total Probable Construction Cost	-						\$42
Total Flobable Construction Cost	4						Ψ-72

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title Discrete Po			Region No. 4			Project No. Fiscal Year	
	te: March 1993	2.1-3- 1 12 12 12 1	Economic Life:	15 YEARS		Preparer: K	ELLER & GANNON
1. Investme			0475				
A. Construc B. SIOH	tion Costs		\$475 \$26	-			
C. Design C	inet		\$0	-			
_	st (1A+1B+1C)		\$501	•			
	/alue of Existing Ed	nuinment	455.		\$ 0		
	lity Company Reba				\$0	_	
	estment (1D-1E-1F)					\$501	
	avings (+)/Cost(-):			_			
Date of NIST	TIR 85-3273-X Usec	for Discount Factors	3				
Energy	Cost	Saving	Annual \$	Discour	nt	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(Savings(5)	
000.00	4 /2 3 /(1)	10.5.0, 1.1(2)	ournigo(o)	. 4515. (•,		
A. Elec.	\$18.23	13	\$233		1.70	\$2,730)
B. Dist	\$4.98	0	\$0		3.78	\$0	
C. Propane	\$7.87	2	\$17		4.16	\$234	
D. Other	NA	0	\$0		VA	NA	
E. Demand	Savings		\$0		1.70	\$0	
F. Total		15	\$250			\$2,96	
3. Non Ener	gy Savings (+) or (Cost (-):					
A. Annual Re	ecurring (+/-)		\$0				
	Factor (Table A)			1 1	1.12		
	ed Savings/Cost (3	A x 3A1)			 	\$0	
B. Non Recu	ırring Savings (+) o	or Cost (-)					
item	Savings(+)	Year of	Discount	Doscou	nted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)		Cost(-)(4)		
				•	,,,,		
a.	\$0	15	0.56		0		
b.	\$0	15	0.56		50		
C.	\$0	15	0.56		0		
d. Total	\$0	0	0.00	•	50		
C Total Non	Energy Discounted	l Savings (3A2+3Bd4)		5 0		
4. Simple Pa	vback 1G/(2F3+3A	.+(3Bd1/Economic L	ife)):		2.0	Years	
	Discounted Savings		··· -//·		\$2,964		
	Investment Ratio				5.91		
	nternal Rate of Ret				49.75%		

Keller	&	Gannon
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	LAUNDERING	SHEET NO OF SHEE
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	and the second second	
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Σ		Gannon

Engineers-Architects

COMPUTED BY BIH ECO (7	PROJECT 16-403-10
DATE MARCH 1993 REPLACE ELEC. BOOSTER	
REV	SHEET NO OF SHEETS
	.)
PGRE SURVEY OF 1982 SUGGESTED T	HE FOLLOWING
	The Collowing 15
18. Garbage can washer booster.	copial from
Demand Reduction = 58.5 kw (booster capacity)	PGRE'S Energy
Energy Savings = 58.5 kw x 730 hrs/yr	Audit Report.
= 42,705 kwh/yr	pudit report.
Cost Savings = 42,705 kwh/yr x \$0.0801/kwh = \$3,420.67/yr	
2 4 12 10 205 lmh/m = 2 /12 PT	71/leach = 1
Additional use of fuel oil = 42,705 kwh/yr x 3,413 BT	.75 boiler eff.
gal/150,000 BTU	
= 1,296 gal/yr	·
Additional Cost = 1,296 gal/yr x \$1.20/gal = \$1,555.20/yr	
Net energy loss at site; net energy gain at source of	electricity
generation.	-
Net Cost Savings = \$1,865.47/yr	
· •	- installed
Estimated Cost = \$3,000 for heat exchanger and piping	, Installed
Simple Payback = \$3,000 cost \$1,865,47/yr savings	
	* -
= 1 year 8 months	·
The second secon	
HOT WATER	20.00
18. Garbage can washer booster.	
Recommend: Consider replacing the electric booste	
washer at building #206 with one with	
existing boiler at that building. This	
cost of cleaning the cans while reducing for the base.	ng the electric demand
Tor the base.	to the second se
1	

FORM 101-1/8

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY BIH	Edo C7	PROJECT_16-4-03-10
DATE WARKS 1993	RESCACE ELEC. BOOSTER	FHL EEAP
		SHEET NO. 2 OF 5 SHEETS
PREV. 19	HEATER FOR CAN WASHER MONIMENDATION: Lectric booster heater to riping from booster DHW supply. 106 DHW to wosh of ring was hing with hold bleath and reventine Medicike": rice bloach mixture ings Calculation Md Savings 58.5 KW gs (non-peak demond char gs (non-peak demond char the 40.80 x 58.5 kW: Savings: 730 hours of (verified Po	con was her. header and lons. Sanitrée a solution water to ascertain requirements.)
	$3.5 \text{kW} \cdot 0.7 = 29,900 \text{K}$	
	diversity Cor multiple, elements	
POST S	avings @ Year - Round Ra	Lo 0550Mes
Car	washing occurs in h	on- perc persos:
a	9900KWH ×40.06223/K	OH = 8 /gk
		0 3
Added No. 2	Fo Cost:	
730 458	5 x 0,7 +3413 /1000000=	102 ×106 BN /12
Estimatel	7 HW B/r 17 = 70.8%	hermel load.
		1-4
,	144 ×106 B7	
Added 1	Fuel Cost \$ 7.87/106BM	× 144 ×10 BTU
Market and transmission of the second of the	= 8-//	33 / YR



Engineers-Architects

			ziginosio / nointotto
CO	MPUTED BY BIH	ECO (7	PROJECT 16-403-10
OH	ECKED BY		FHL EEAP
DAT	TE MARCH 1993	REPLACE ELEC. BOOSTE	<u>R</u>
RE\	/ 19	REPLACE ELEC. BOOSTE HEATER FOR CAN WASHE	SHEET NO. 3 OF 5 SHEETS
			9
		ENERGY SAUNGS	
-	SUM HAPY	everes sacross	
		Savingsy	Unit Cost Cost Saved
	ELECTRIC	DEMAND 58.5KW	\$40.80 \$2387
		USE 29,900 K	WH \$0.06223 \$1861
i	F1.57		N)\$ 7.87 \$(1133)
Į.	FUEL OF		
Ì.	TOTAL		#_3115/yr.
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	Neglect adde	a cust by breach as	mining Compare
	to evergy	d cost of bleach as	s than \$100/41)
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CONSTRUCTION COST E	STIMA	ΓE		DATE PREPARED FEBRUARY	1993	SHEET	4 of 5
PROJECT					RESTIMATE		
FEAP LIMITED ENERLY	STUD			PRAT. No. C7 X CODE A (No design completed)			
ocation FORT HUNTER LIGGET	7 (A)	LIES D	416	RIJA 206		E B (Preliminary	deeign)
RCHITECT ENGINEER	1, 01	J. () . (7111	Sidy No.		CODE C (Final de IER (Specily)	eign)
KELLER & GANNON		,					
PRAWING NO.	•	ESTIM	BIH]	CHECKED BY	
Disconnect Booster	QUANT	ITY		LABOR	l M	ATERIAL	I
Heater for Can Washer	NO. UNITS	UNIT	PER	TOTAL	PER	TOTAL	TOTAL COST
		-	UNIT		J.		
		1 4 4 4	4 - 1	4			
Disconnect Electric		MH	40.1	40	10	10	50
		-	4				
) IS connect Exty Plumb.		MH	41.5	41.5	-		42
Connection to Hr							ļ
Install 3/4"CU Pipe	20	LF	4	80	3	60	140
from DHW to Can-			<u> </u>				
Wash piping							
Insulate 3/4 CU Price	20	LF	24	48	1.4	28	76
•			1			,	
			1				
		 	 	-	_		
		-	-			<u> </u>	
	 	+-	-	1		<u> </u>	
· C10-4-1	 	+	-		-		7.00
SUBTOTAL 20/		1	+-	1	+		308
SALES TAX E 8%		+-	+-	-	-		25
SUBTOTAL			 -	-	ļ <u> </u>	ļ	3.33
CONTRACTOR OH & PROFIT @30 %	ļ	+	-	-	1-		100
BOND E 1 %			 -				433
			-	-	-		4:
. SUBTOTAL			-		1-		437
ESTIMATING CONTIL GENCY @ 10%				_	-		44
TOTALA CONSTRUCTION COST			_	-		_	481
	1						

77.

Life Cycle Cost Analysis Summary ECO C7 Energy Conservation Investment Program (ECIP) Sheet 5 of 5

Location:	Fort Hunter Lig	gett. California	Region No. 4		Project No. 1	6-403-10
	: Remove Electric				Fiscal Year	FY96
Discrete Por	rtion Name: ECO#	# C-7, Bldg 206				
Analysis Da	te: March 1993		Economic Life:	15 YEARS	Preparer: KEI	LER & GANNON
1. Investmer	nt Costs					
A. Construc	tion Costs		\$481	-		
B. SIOH			\$26	-		
C. Design C			\$29	-		
	st (1A+1B+1C)	A	\$536			•
	Value of Existing E			\$0	_	
	lity Company Reb			\$0		
G. Total Inve	estment (1D-1E-1F	7)			\$536	
2 Fremy S	avings (+)/Cost(-)					
Date of NIST	TIR 85-3273-X Use	d for Discount Facto	rs	•		
Energy	Cost	Saving	Annual \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	•
A. Elec.	\$21.84	102.0	\$2,229	11.70	\$26,076	
B. Dist	\$4.98	(144.0)	(\$717)	13.78	(\$9,882)	
C. Propane	\$7.87	0.0	¯ `\$ 0	14.16	\$0	
D. Demand	\$108.60	58.5	¯k ∞ \$6,353	11.70	\$74,331	
E. Other			•			<u> </u>
F. Total			\$7,865	.	\$90,526	
3. Non Energ	gy Savings (+) or	Cost (-):		_		
A. Annual Re	ecurring (+/-)		\$0 \$7			
(1) Discount	Factor (Table A)			11.12		
(2) Discount	ed Savings/Cost (3A x 3A1)			\$0 %	
D. Non Dear		an Oast ()				<u>, 4</u>
B. NOT RECU	ırring Savings (+)	or Cost (-)				
item	Savings(+)	Year of	Discount	Doscounted Sav	-	- 18 J.
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4))	
a. :-			_		_	
b. ::			_		_	
C.					_	
d. Total					•	- ক্রেট্র -
C Total Non	Energy Discounte	nd Savings (3A2+3B	d4)	\$0 ≰		<u></u>
4. Simple Pa	yback 1G/(2F3+3	A+(3Bd1/E∞nomic	: Life)):	0.1	Years	(1)
	Discounted Saving		••	\$90,526		
	Investment Ratio			168 79		

1467.00%

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY BIR	RECOVER HEAT FROM	PROJECT 16.403-10
DATE HARCH 1993	DINING FACILITY	
REV 19	DISHWASHING	SHEET NOOFSHEETS

DESCRIPTION OF ACTION

Install a commercial type package heat recovery unit at each dishwashing location in facility 206. The unit extracts waste heat from dishwasher discharge and uses it to preheat cold water make-up.

The Waste Energy Transfer System, Molitor Industries, Inc. 1 ecycles 70% to 75% of energy normally wasted.

FACILITYES INCLUDED

DINING FACILITY, BLDG 206

ENERGY SAVING CALCULATION

Refer to attached brochure for supporting Lata.

DIW to dishwasters is provided at 140 °F from bldg system, fuel oil final, average thormal efficiency 70.8 %. Of the total DHW heating fuel use of 406 Hil Brulyr, 50 % is assumed used in dishwasters.

DIStimasters heat DAW from the supply Loup. is

75% heat recovery is possible:

75% recovery = 321×0.75 = 240×10 BTUly, dishwashing.

Recovery!

Keller & Gannon

COMPUTATION SHEET

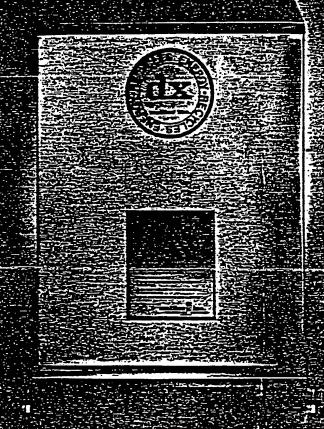
Engineers-Architects

CHECKED BY	ECO C-8 RECOVER HEAT FROM DIVING FAC. DISHWASHENG	FHL EEAP SHEET NO. 2 OF 8 SHEETS
Recovered ha	eet is sout to the	DAW Makeup;
- Avoided use	de Cuel oil is:	
240 40	Brokr = 339 ×106	STU/YF FUEL OIL
	339 ×106 BWigr = \$ 168	
Allow 4hrs = cleoning, etc	/gear @40 \$/Hr for p. 60/year.	naintenouse,

FORM 101-1/8

Some Millions of Bruss Elling Scale of Colors Amini of the

ECD CB Shoot3 of 8



The Motion of Worle Energy Transfer System



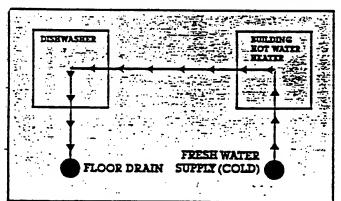
Wasie Energy Transfer System for Commercial Dishwashers can Save Millions of BTU's & Hundreds of Dollars Annually

The Molitor dx Waste Energy Transfer System

The energy used to heat hot water for washing dishes results in one of the highest energy costs a foodservice operator must face. Even a small commercial dishwasher wastes over 140,000 gallons of hot water each year; that equals over 100 million BTU's down the drain.

Today, Molitor, Inc. has an alternative to wasting that energy — the Molitor dx Waste Energy Transfer System for commercial dishwashers. This simple yet effective device recycles 70% to 75% of the energy normally wasted by a dishwasher and returns it to the hot water heater. Here's how it works.

During the dishwasher rinse cycle, the hot waste water normally thrown away now drains into the

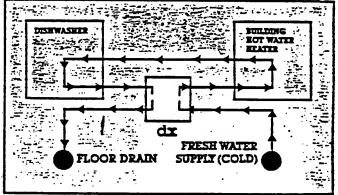


Without dx : Energy Wasted To Floor Drain

ANNUAL SAVINGS Sample

Gallons Used	BTU's Saved
100.000	63,380,000
300,000	190.140.000
500.000	316,900,000

lower section of the dx unit. A switch senses the water and actuates a pump which circulates this hot water through the heat exchanger. At the same time, cold fresh water is moving counterflow through the dx where it picks up heat from the waste water. After this transfer takes place, the cooled waste water drains to a normal floor sink and the pre-heated fresh water moves on to the building water heater.



With dx: Energy Recycled To Hot Water Heater

BENEFITS & FEATURES

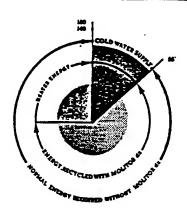
- Recycles 70% to 75% of the recoverable energy normally wasted by a commercial dishwasher.
- Uses this energy to pre-heat the cold water supply to the building hot water heater.
- Helps solve hot water shortage problems in existing toodservice operations.
- On new installations or remodels, the dx can reduce your hot water heater size.
- Works with both high or low temperature machines.

- Improves grease trap efficiency by reducing waste water temperatures.
- Compact, self-contained unit fits u dishtable.
- Only two moving parts.
- Easily installed, easily maintained.
- A complete separation of waste and politice water to comply with plumbing sanitation codes. LAPM.O. approved.
- Qualifies for investment and energy tax credits.
- Tested and efficiency, certified by an independent testing laboratory. Test data available on request.

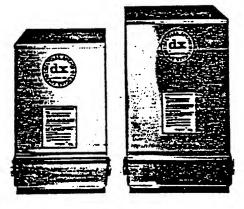
ENERGY SAVINGS

The Molitor dx Waste Energy Transfer System cycles 70% to 75% of the recoverable energy armaily wasted by a commercial dishwasher. Depending on business volume, energy costs, and the type of dishwasher, the dx will pay for itself in 1/2 to 3 years. As energy costs continue to increase, so do your savings.

A complete, no obligation energy analysis is available for your particular operation. Simply complete the attached reply card and drop it in the mail. See how much you could be saving by RECYCLING ENERGY!



SIZING



The dx Waste Energy Transfer System is available in two standard sizes.

The dx-2 is designed to work with most single tank. door-type dishmachines and those which use 2 gallons or less during a complete washing cycle.

The dx-4 is sized for those machines which use up to 6 gallons of water per complete cycle or less than 6 gallons per minute.

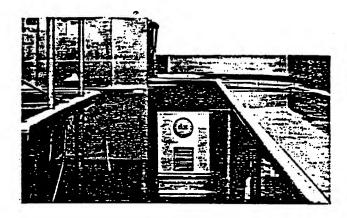
Consult your dishwasher specifications for water usage information or contact Molitor, Inc. for correct sizing.

ENERGY TAX CREDIT

The Molitor dx Waste Energy Transfer System is designed and manufactured for the sole purpose of reducing the amount of energy consumed in any "dustrial or commercial facility, both new and asting. When installed in connection with an existing facility, the Molitor dx is intended to quality for energy tax credits.

Consult your tax advisor with any specific questions regarding this issue.

SPECIFICATIONS

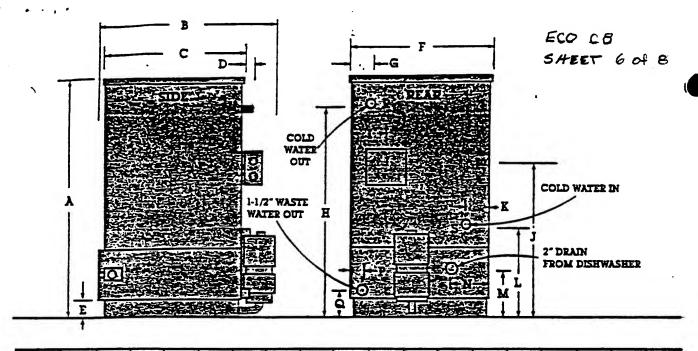


Dishmachine Waste Water Heat Exchanger shall be a self-contained, compact unit sized to fit beneath dishtable adjacent to dishmachine. The unit shall be capable of transferring heat from the hot waste water of the dishmachine to the fresh, incoming water supply for the building water heater. The Heat Exchanger shall be fabricated to provide a complete separation of the fresh, potable water from the dishmachine waste water and shall be approved by the International Association of Plumbing and Mechanical Officials as meeting all requirements of the Uniform Plumbing Code. All electrical components shall be U.L. Classified.

Waste Water Heat Exchanger shall be Molitor dx Series Waste Energy Transfer System as distributed by Molitor. Industries Inc. of Englewood. Colorado 80110.

WARRANTY

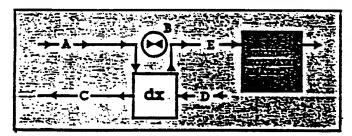
The Molitor dx Waste Energy Transfer System carries a one year guarantee on all parts and materials and a 90 day guarantee on labor. Refer to Owners Manual for complete details on this warranty.



		A	В	C	D	E	F	G	H	I	J	K	L	M	N	P	ø	R	S
C	1x-2	26.4	217	1672	72	133	16.5	35	24%	575	18片	21/2	37/4	340	342	TXI	232		交翼
6	1x-4	30.05	23 6	1892	经		18%	3倍	28%	媭	16%	345	955		345	199	716	199	100

PLUMBING

one dx unit should be hard piped to ground (cold) water and to the hot water heater. The pre-heated line from the dx to the water heater should be insulated to prevent heat loss. The drain connection from the dishwasher to the dx can be hard piped or hose connected. (Verify with Local Plumbing Code)



MOLITOR PRODUCTS PRODUCED UNDER U.S. AND FOREIGN PATENTS.

The Molitor ax Waste Energy
Transfer System is approved by the
International Association of
Plumbing and Mechanical Officials
meeting the requirements of the
uniform Plumbing Code also by the
City of Los Angeles. CA Mechanical
Inspection Department.

ELECTRICAL

Requirements: 120V, 2.1 Amps.



- A. Cold Water Supply.
- B. By-Pass Arrangement.
 Used only when line
 size to water heater is
 larger than dx line
 size.
- C. 1-1/2" Indirect Waste Line.
- D. 2" Drain from Dishwasher.
- E. Pre-heated Water Line to Hot Water Heater (insulated).

• 1980 Molitor Industries Inc
Specification subject to change without notice.

MOLITOR INDUSTRIES INC.

dx Division

2829 South Santa Fe Drive P.O. Box 1218 Englewood. Colorado 80150 303-789-2231 - 800-525-9494 TWX 910-933-0179



				Date Prepared		Sheet	OF
CONSTRUCTION COST ES	February 1993 7 8						
Project				Project No.	Basis for Esti	mate	
EEAP Limited Energy Study				16-403-10			
Location					Code A (no	design competed	1)
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon		Estimato	r		Checked By		
ECO-C8 Dishwasher Heat Recovery		RJB			ВІН		
200 00 21011111011111111111111111111111		antity		abor	Mate	rial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 206							
Molitor or Equal Unit	1	Ea	\$352	\$352	\$1,217	\$1,217	\$1,569
Drain Piping 2-inch Galv	20	LF	\$8.99	\$180	\$6.78	\$136	\$315
Water Piping 1-inch CU	130	LF	\$6.14	\$798	\$3.52	\$457	\$1,256
Pipe Insulation 1-inch @ pipe	130	LF	\$2.52	\$328	\$1.47	\$191	\$519
Wiring	-	Job	\$100	\$100	\$50	\$50	\$150
Subtotal Building 206							\$3,808
Sales Tax 8%							\$305
Contractor O.H. & P 30%							\$1,142
Sub Total							\$5,255
Bond 1%							\$53
Sub Total							\$5,308
Estimating Contingency 10%							\$531
Total Probable Construction Cost							\$5,839
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Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO C9

25%

Sheet 8 of 8

Location: Fort Hunter Liggett, California Region No. 4 Project No. 16-403-10 Project Title: Dishwasher Heat Revovery Fiscal Year FY96 Discrete Portion Name: ECO# C-8, Bldg 206 Analysis Date: March 1993 Economic Life: 15 YEARS Preparer: KELLER & GANNON 1. Investment Costs A. Construction Costs \$5,839 B. SIOH \$321 C. Design Cost \$350 D. Total Cost (1A+1B+1C) \$6,510 E. Salvage Value of Existing Equipment \$0 F. Public Utility Company Rebate \$0 G. Total Investment (1D-1E-1F) \$6,510 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Energy Cost Saving Annual \$ Discount Discounted Source \$/MTBU/(1) MBTU/YR(2) Savings(3) Factor(4) Savings(5) A. Elec. \$21.84 0.0 \$0 11.70 \$0 B. Dist \$4.98 339.0 \$1,688 13.78 \$23,263 C. Propane \$7.87 0.0 \$0 14.16 \$0 D. Demand \$108.60 0.0 \$0 11.70 \$0 E. Other F. Total \$1,688 \$23,263 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) (\$160)(1) Discount Factor (Table A) 11.12 (2) Discounted Savings/Cost (3A x 3A1) (\$1,779) B. Non Recurring Savings (+) or Cost (-) Savings(+) Item Year of **Discount** Doscounted Say-Cost(-)(1) Occur. (2) Factor(3) ings(+)Cost(-)(4)a. b. C. d. Total C Total Non Energy Discounted Savings (3A2+3Bd4) (\$1,779)4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): Years 4.3 5. Total Net Discounted Savings (2F5+3C): \$21,483 6. Savings to Investment Ratio (SIR) 5/1G: 3.30

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY JCS	ECO#C9	PROJECT FHL EEAP
CHECKED BY B/H DATE FEBRUARY 19 93	AUTOMATIC BOILER	
REV19	FLUE DAMPERS ON	SHEET NOOFSHEETS

DAW SYSTEMS

DESCRIPTION OF WORK

THE OPPORTUNITY LOOKS AT THE POTENTIAL ENERGY SAVINGS CREATED BY THE INSTALLATION OF A DAMPER WHICH CLOSES OFF THE FLUE WHEN THE BOILER IS RUNNING IN STAND BY MODE.

ABOUT 2.3% OF THE BOILERS CAPACITY THROUGH LOSSES THROUGH THE FLUE UNDER STANDBY CONDITIONS.

BUILDINGS INCLUDED

SEE ATTACHED PRINT-OUTS

ENERGY SAUTUGS CALCULATIONS

ENERGY SAUINGS ARE DETERMINED BY

ASSUMING A 1.5% THERHAL EFFICIENCY

EMPROVEMENT IN FIRED EQUIPMENT USED

TO HEAT DHW. SAUINGS ARE

CALCULATED AS FOLLOWS

WHERE: QS = FUEL SAUINGS

Q0 = BASELINE (AFTER REDUCTION OF DAW TEMPS TO AUTH, LEVELS &

ECO C-1) FUEL USE

7 = BASELINE DAW HEATING EFFICIENCY

CONSTRUCTION COST ES	TIMAT	-		Date Prepared February	1993		OF &
Project	Project No.	- 1					
EEAP Limited Energy Study				16-403-10	Dasis IOI	Camilate.	
Location				110 100 10	Code A	(no design comp	eted)
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon Drawing No.		Estimate	or .		Checked	Bv	···
ECO-C9 Install Automatic Flue Damp	ers on	RJB			BIH	-,	
	Qu	antity		por	A	Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
GAS FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$134	\$134	\$166
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Gas Fired							\$346
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$104
Sub Total							\$478
Bond 1%							\$5
Sub Total							\$483
Estimating Contingency 10%							\$48
Total Probable Construction Cost							\$531
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$138	\$138	\$173
Relay & Wiring	-	Job	•	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Gas Fired							\$353
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$106
Sub Total							\$487
Bond 1%							\$5
Sub Total							\$492
Estimating Contingency 10%							\$49
Total Probable Construction Cost							\$541
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$152	\$152	\$190
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Gas Fired							\$370
Sales Tax 8%	_						\$30
Contractor O.H. & P 30%							\$111
Sub Total							\$511
Bond 1%							\$5
Sub Total							\$516
Estimating Contingency 10%							\$52
Total Probable Construction Cost							\$568

<u> </u>				Date Prepared		Sheet	OF
CONSTRUCTION COST E		February 1993 3					
Project			··	Project No.	Basis for	I Estimate	
EEAP Limited Energy Study				16-403-10		.	- 4 10
Location Colifornia					Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect					-		
Keller & Gannon							
Drawing No.		Estimato	r		Checked	Ву	
ECO-C9 Install Automatic Flue Damp	oers on	RJB			BIH		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	faterial Total	Total Cost
OIL FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$156	\$156	\$188
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Oil Fired							\$368
Sales Tax 8%			· ·				\$29
Contractor O.H. & P 30%		1					\$29
Sub Total							\$426
Bond 1%					İ		\$4
Sub Total			*******				\$431
Estimating Contingency 10%							\$43
Total Probable Construction Cost							\$474
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$161	\$161	\$196
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Oil Fired							\$376
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$113
Sub Total							\$519
Bond 1%							\$5
Sub Total							\$524
Estimating Contingency 10%							\$52
Total Probable Construction Cost							\$576
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$161	\$161	\$199
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Oil Fired			******				\$379
Sales Tax 8%			· ·				\$30
Contractor O.H. & P 30%							\$114
Sub Total							\$524
Bond 1%							\$5
Sub Total							\$529
Estimating Contingency 10%							\$53
Total Probable Construction Cost							\$582

Fac		ECO	ECO C3	Energy Savings:		Automatic Flue Dampers	Jorg					
Š.	Installation Name	6-5	Fuel Oil	Propane		FO Ann.	Prop. Ann.	Elec. Ann.	22]	Constr	Investment	als
		Incl.	Mil BTU/Yr	2	MW-Hr/Yr	\$ Savings	\$ Savings	\$ Savings	Savings	Cost		
1 6	Family Housing NCO & Enl	Yes	•	1.07	•	0\$ \$	88	\$0	\$120	\$531	Z65\$	0.20
P 41A	Family Housing NCO & Eni		•	•	•	\$	\$0	\$0	\$	-	•	٠
P 41B	Family Housing NCO & Enl		•	-	•	\$	\$0	\$0	\$0	•	•	•
P 42A	Family Housing NCO & Enl		•	•		\$0	\$0	\$0	0\$	•	1	•
P 42B	Family Housing NCO & Enl		•	-	•	\$0	\$0	\$0	\$0	•	•	
P 43A	Family Housing NCO & Enl		•	-	•	0\$	\$0	\$0	\$0	•	•	•
P 43B	Family Housing NCO & Enl		•	•	•	\$	\$0	\$0	\$	•	•	•
P 44A	Family Housing NCO & Enl		•		٠	\$0	\$0	\$0	0\$	•		•
P 44B	Family Housing NCO & Enl		•	Ē		\$0	\$0	\$0	\$	•	•	•
P 45A	Family Housing NCO & Enl		•	•		\$0	\$0	\$0	\$	•	•	•
P 45B	Family Housing NCO & Enf		1	*	•	0\$	0\$	\$0	\$0	•	•	•
P 46	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	\$	•	•	•
P 47	Family Housing CG & WO	¥	•	•	•	0\$	\$0	\$0	\$	•	•	
P 51A	Family Housing NCO & Eni		•	•	•	0 \$	\$0	\$0	\$0	•	•	•
P 51B	Family Housing NCO & Enl		•	•		\$0	\$0	\$0	\$0	•		
P 52A	Family Housing NCO & Enl		•	•	,	\$0	\$0	\$	\$0		•	-
P 52B	Family Housing NCO & Enl		•	1	•	0 \$	\$0	\$0	\$	•	•	•
P 53	Family Housing CG & WO		•	1	•	\$0	0\$	\$0	\$0	•	•	•
25	Family Housing CG & WO		•	•		\$0	\$0	\$0	\$0		•	•
P 55	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	0\$	•		•
P 56	Family Housing CG & WO		٠	-	•	\$0	0\$	\$0	\$0		•	•
P 57	Family Housing CG & WO		•	1	•	\$0	\$0	\$0	\$0	•	•	
P 58	Family Housing CG & WO		•	-	•	0\$	0\$	\$0	\$0	•	•	-
P 59	Family Housing CG & WO		٠	•	٠	\$0	\$0	\$0	\$0	•	•	•
P 60	Family Housing CG & WO		٠	•	٠	\$0	\$0	\$0	\$0	•	•	•
S 79	Post Office, Main		•	1	•	\$0	\$0	\$0	\$0	•	•	•
200	Exchange, Main Retail		•	1	•	S S	\$0	\$0	0\$	1	,	1
181	I heater with Dressing Rm's		,	•	•	\$0	\$0	\$0	0\$	•	,	,
5	Open Din Cons (Hacienda)	Yes	-	2.59	٠	S S	\$20	\$0	\$289	\$268	\$633	0.46
	Club (Bar)	Yes	•	0.50	٠	\$0	\$4	\$0	\$56	\$531	\$592	0.09
	Hacienda, Dwellings	Yes	•	1.57	٠	\$0	\$12	\$0	\$175	\$568	\$633	0.28
		Yes	•	2.41	•	\$0	\$19	\$0	\$269	\$568	\$633	0.42
P 116	Exchange Service Station		-	•	•	\$0	\$0	\$0	\$0	•	•	•
	(Non-shop areas)		•	•	•	\$0	\$0	\$0	0\$	•	,	,
T 120	Fire Station - Office	Yes	•	0.68	•	\$0	\$2	\$0	\$76	\$568	\$633	0.12
	Fire Station - Dorm	Xes	•	4.01		\$	\$32	\$0	\$447	\$268	\$633	0.71
	Fire Station - Garage		.	•	•	₽	\$0	\$0	0\$	•	•	٠

Ž	Installation Name	0.0	1	Oil Propage	1	Flectric I EO Ann Dro	Prop App	Elec Ann	l VV	Conctr	thompson	SIB
į		Incl.	Mil BTU/Yr	_			\$ Savings		Savings	Cost		ב ס
T 121	Bowling Center	Yes	•	06'0	•	_	25	\$0	\$100	\$531	\$592	0.17
			•		•	\$0	\$0	\$0	0\$	•	•	•
	Family Housing LC & MJ	Yes	•	2.15	•	0\$	\$17	0\$	\$240	\$531	\$592	0.40
127	Officers Quarters Military	Yes	•	2.49	•	\$0	\$20	0\$	\$278	\$568	\$633	0.44
P 128	Officers Quarters Military	Yes	-	15.78	•	\$0	\$124	0\$	\$1,759	\$568	\$633	2.78
131	Family Housing CG & WO	Yes	-	2.23	•	\$0	\$18	\$0	\$249	\$531	\$592	0.42
S 144	Gymnasium		,	•	•	0\$	\$0	\$0	0\$	•	•	•
S 146	FE Facility		-	•	1	\$0	\$0	0\$	0\$	•	•	
149	Family Housing NCO & Ent	Yes	•	2.12	•	\$	\$17	\$0	\$236	\$531	\$592	0.40
156	FE Facility - Shop		-	-	-	\$0	\$0	\$0	\$0	•	•	•
	FE Facility - Office		-	-	•	\$0	0\$	\$0	0\$	•	•	•
158	Vehicle Storage		-	•	•	\$0	0\$	\$0	0\$	•	•	•
161	Admin General Purpose		•	•	'	\$0	\$0	\$0	\$0	•	1	•
162	Elec Maint. Shop		•	-	•	0\$	\$0	0\$	\$0	•	-	•
163	Officers Quarters Military		-	•	•	0\$	0\$	\$0	\$0	•	•	
164	Admin General Purpose		-	-	-	\$0	\$0	0\$	\$0	٠	-	•
165	Admin General Purpose		-	-	•	\$0	\$0	\$0	\$0	•	,	•
166	Officers Quarters Military		-		-	\$0	\$0	\$0	\$0	•	•	ľ
167	Officers Quarters Military		•	•	1	0\$	\$0	\$0	0\$	•	•	
S 168	General Purp Warehouse		-	•	1	\$0	\$0	\$0	\$0	•	1	
172	Cold Storage Warehouse		-	•	-	\$0	\$0	\$0	0\$	•	•	
P 177	Technical Library		1	١	•	\$0	\$0	\$0	0\$	•	•	•
P 178	Child Development Cntr		٠	•	•	\$0	0\$	\$0	0\$	•	-	•
	Commissary		•	1	1	\$0	\$0	0\$	0\$	•	•	•
	Sup Svc Admin Bidg		١	•	•	\$0	\$0	\$0	0\$	•	•	•
P 190	Post Chapel		•	•	•	\$0	\$0	\$0	0\$	•	•	•
S 197	Admin Bidg R&D - Office		•	•	•	\$	\$0	\$0	0\$	•	•	•
	Admin Bidg R&D - Electronics		•	•	•	\$0	0\$	0\$	0\$	•	•	•
S 198	General Inst Bidg			1	•	0\$	\$0	0\$	0\$	•	•	
P 205	Admin General Purpose	Yes	1.52	•	•	\$8	0\$	0\$	\$104	\$585	\$649	0.16
4	Company HQ Building		•	•	•	0\$	0\$	0\$	0\$	•	•	•
P 206	Enlisted Pers Dining Fac	Yes	18.78	•	٠	\$94	0\$	0\$	\$1,289	\$1,164	\$1,298	0.99
	Kitchen Area - Scullery		-	•	1	\$0	0\$	0\$	0\$	•	•	
P 207	Eni Barracks w/o Dining	Yes	7.20	•	•	\$36	\$0	0\$	\$494	\$585	\$649	0.76
P 207A				•		\$0	0\$	0\$	0\$	•	•	•
P 208	Eni Barracks w/o Dining	Yes	7.70	•		\$38	0\$	0\$	\$258	\$585	\$649	0.81
P 208A	Company HQ Building		•	•	•	C #	¥	₩	U-P			

				S			DEIS					
Ö Z	Installation Name	ဂ ပ	Fuel	Oil Propane		FO Ann.	p. Ann.	Elec. Ann.	227	Constr	Investment	SIR
P 209	AAFES Spack Bar	5		_	MW-Hr/Yr	\$ Savii	\$ Savings	\$ Savings	Savings	Cost		
250	Lith/Dayl Clinio/ D. J.	ļ		1		\$0	\$0	\$0	\$0		•	•
2 5	min/Duit Clinic W/ Beds	Yes	51.02	•	1	\$254	\$0	0\$	\$3,501	\$576	\$642	5.45
172	Outdoor Swimming Pool		•	•	•	\$0	\$0	0\$	0\$		•	•
P 212	Gymnasium	Yes	-	0.48	•	\$0	\$	\$0	\$53	\$541	\$603	600
P 219	Physical Fitness Center	Yes	•	1.31	1	\$0	\$10	\$0	\$145	\$541	\$603	0.24
P 229		Yes	3.43	•	1	\$17	\$0	\$0	\$235	\$582	\$649	98.0
P 229A			•	-		\$0	\$0	\$0	\$0		2 .	3
P 230	Eni Barracks w/o Dining	Yes	6.91	•	•	\$34	\$	0\$	\$474	\$582	\$640	0.72
P 230A			-	•	•	\$0	\$	9	\$0	-	2	0.73
33			•		•	\$0	\$0	0\$	0\$	-	•	
S 236	Admin General Purpose		-	•	•	\$0	\$0	9	0\$	•		
S 237	Admin General Purpose		•		•	\$0	\$0	0\$	0\$			
8	Sig Photo Lab	Yes	•	0.95	•	\$0	\$7	\$	\$105	\$541	\$603	0 47
	Process	Yes	•	8.34		\$0	99\$	0\$	\$929			5
P 240	Admin General Purpose		1	-		\$0	0\$	\$	\$0		ľ	
4	GM Facility		•	•	•	0\$	\$0	0\$	\$0	•	•	
			•	•	•	0\$	\$0	\$0	\$0		•	
			•	•	•	0\$	\$0	\$0	\$0	-		•
\$ 243	Admin General Purpose		•	•	•	\$0	\$0	\$0	\$0			
5 244	Admin General Purpose		,	-	•	0\$	0\$	0\$	\$0	-	•	
5 246	Admin General Purpose		•	•		\$0	0\$	\$0	\$0		•	
5 247	Admin General Purpose			-	•	0\$	0\$	\$0	\$0	-	•	
25	Vehicle Maint Shop DS		•	•	•	\$0	0\$	\$0	\$0		Ī	•
P 256	Vehicle Maint Shop ORG		-	•	٠	\$0	\$0	\$0	\$0	-	·	•
P 259	Vehicle Maint Shop ORG		•	•	•	\$0	\$0	\$0	\$0			•
5 283	FE Maintenance Shop			•	•	\$0	0\$	\$0	\$0		•	•
3	-			•	•	\$0	0\$	\$0	\$0		•	
2000	Admin General Purpose		•	•	•	\$0	0\$	\$0	\$0	•		•
200	Recreation Building	\ Kes	•	1.06	•	\$0	\$\$	0\$	\$118	\$531	\$592	0.20
2,288	General Purpose Warehouse			•	•	\$0	0\$	0\$	0\$		•	•
3	Electron Equip Facility	Yes	•	1.46	٠	\$0	\$11	0\$	\$162	\$541	\$603	0.27
7			1	•	٠	\$0	0\$	\$0	\$0	Ų		•
167.0	Cont Humid Warehouse		-		•	\$0	0\$	\$0	\$0		•	
200	Eni Barracks W/o Dining	Yes	•	15.21	٠	\$0	\$120	\$0	\$1,696	\$568	\$633	2.68
5	ADP Bullaing		1	•		\$0	0\$	0\$	\$0			•
			•	•	-	\$0	\$0	\$0	\$0			•
_				•	•	Ç	Ş	4	Ç			

ECO C-9 Sheef 7of8

Fac		ECO		nergy Savings: Automatic Flue Dampers	: Automatic	s Flue Dam	pers					
Š	Installation Name	6-0	C-9 Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann. Elec. Ann.	Elec. Ann.	227	Constr	Investment	SIR
		Incl.	Mil BTU/Yr	MII BTU/Yr MI	MW-Hr/Yr	AW-Hr/Yr Savings Savings Savings	\$ Savings	\$ Savings	Savings	Cost		
P 642	Detached Latrine/Shower	Yes	•	2.18	•	0\$	21\$	0\$	\$243	\$531	\$592	0.41
S 2201 C	Control Tower - Range SPT		1	•	•	0\$	0\$	0\$	0\$	•	•	•
SIR>1			51.0	31.0	0.0	\$254	\$244	0\$	\$6,955	\$1,712	\$1,909	3.64
Totals						Totals for SIR >	SIR > 1 Bldgs:	gs:	128, 210 and 295 only	1 295 only		

Life Cycle Cost Analysis Summary ECO C9 Energy Conservation Investment Program (ECIP) Sheet 8 of 8

	: Add Zone Optin	ggett, California Nizer Centrel Avlue PB 18, Bldg 81 C-9		npevs	Project No. 16-403-10 Fiscal Year FY96
	te: March 1993	5-10,0mg-0-1	Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investmer	nt Costs				
A. Construct			\$1,712	•	
B. SIOH			\$94	•	
C. Design C			\$103	•	
	t (1A+1B+1C)		\$1,909		
	Alue of Existing E			\$0	
	lity Company Reb estment (1D-1E-1F			\$0	\$1,000
G. TOTAL III	sament (10-12-11	,			\$1,909
	avings (+)/Cost(-)				
Date of NIST	IR 85-3273-X Use	d for Discount Factors	•		
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	0.0	\$0 -	11.70	\$0
B. Dist	\$4.98	51.0	\$254	13.78	\$3,500
C. Propane	\$7.87	31.0	\$244	14.16	\$3,455
D. Demand	\$108.60	0.0	k \$ 0	11.70	\$0
E. Other					
F. Total			\$498		\$6,954
3. Non Energ	gy Savings (+) or	Cost (-):			
A. Annual Re	curring (+/-)		\$0		
	Factor (Table A)			11.12	
(2) Discounte	ed Savings/Cost (3A x 3A1)			\$0
B. Non Recu	rring Savings (+)	or Cost (-)			
ltem	Savings(+)	Year of	Discount	Doscounted S	av-
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)	
a.					
b.					
C.					
d. Total					-
C Total Non i	Energy Discounte	d Savings (3A2+3Bd4)	\$0	
		A+(3Bd1/Economic L	ife)):	3.	8 Years
5. Total Net D	iscounted Saving	s (2F5+3C):		\$6,95	4
	Investment Ratio			3.6	4
7. Adjusted Ir	nternal Rate of Re	turn (AIRR):			

Keller & Gannon

Engineers-Architects

COMPUTED BY	TETROFIT EXTERIOR	PROJECT 16-403-10
CHECKED BY	LIGHTING WITH HPS FIXTURES	
DATE	Eco# D3	SHEET NO. 1 OF 1 SHEETS
4		2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
DESCRIPTION OF A	CTION	
		N. In. Co. and Co. Co.
	ES EXISTING MERCURY UAPOR	
	MORE EFFICIENT HIGH PRESSUR	
	TED INCLUDE THE FOLLOWING	ONE - POILS, ONE
REPLACEMENTS :	Initial wa	PETTINELL
No. Existing	PROPOSED % CHAN	ngs Kensophi
175W MV	100W HPS +17	
3. 250W mV	150W 17PS +2	
- c 400W MV	250W APS + 27	
D. 1000 M Quants	200W 17PS + 1	
		(FIELDS & CONRTS)
- UNIT RETIDET IL	CC ANALYSIS	ANNAL
NO EXIST WATES PROPOSED	WATE REDACTION KW OP HOURS/40	USE FACTOR SAVINGS. KWH
A 197 130	.067 4,160	.70 195
B. 285 173	-112 4,160	.70 326
c. 469 302	.167 4,160	.70 486
D. 1000 240	.760 200	1.00 152
AND THE PROPERTY OF THE PROPER	L	20
NO. MATLE LABORS	PERTY INVEST. SAVINGS SAVINGS	EL SANACS SAVINGS SIR
A 186 34	36 348 (64) 30	142 108 0.31
B 198 36	40 362 (35) \$1	237 253 0.70
266 37	60 462 (56) 76	354 374 0.81
D: 330 107	60, 686 38 345	111 494 0.72
	95.74 72.14	
INVESTMENT = [MAT'L	X1.08) + LARIR X 1.30 x 1.01 X1.10 X	1.115 5 - PATE REBATE
21 0 tm SAVINGS = \$/ 00	Howas x Cost of Op: Homes Transplies x RELAMPORTS WEWLAND	NES RELAMPONED
FARE	I LAMP LIFE RELAMINALY) WEN LAMP L	NELAMPING)
3 Knd SAVINGS = KIND	SAVINGS X 9 40.80/KW X 11. 12 M	W*.
-41-4 DU COUNTES 2 VOTE	} SAVINGS X * 0.06223/ KWH X 11.7	o- NPW*
TI PART SHEET TO		
RACKA ANT TUS A	BING MINT AWALYSIS, THIS MEASI	are is not last effective
7,100,000	The Market	

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	REPEACE INCANDESCENT	PROJECT 16-403-10
CHECKED BY	LIGHTING WITH FLUORESCIENT	
REV. JUNE 1993	ECO # D+	SHEET NO. 1 OF 35 SHEETS

DESCRIPTION OF ACTION

THIS PROTECT WOULD REPLACE IN EFFICIENT INCANDESCENT FIXTURES WITH EFFICIENT COMPACT FLUORESCENT FIXTURES OR FORR-FOOT FIXTURES WITH ELECTROPIC BALLASTS AND TO LAMPS. REPLACEMENTS ANALYZED ARE AS FOLLOWS:

DATA & ASSUMPTIONS

	EXISTIN	G INCANDESCE	2	REPLACE	EMENT	KLUORES	ENT
DES16-	WATTS	MEAN LIFE (HRS)	RELAMPING WST	TYPE	WATTS	MEANUFE	RELAMP. COST
A	60	1000	152 + 152 LABOR	13W/5T4	17	10000	1000 + 300 LAR
В	75	750	150/+ 150 LABIR	1811774	25	19,000	100 130 LAR
C	10.6	750	299 + 159 LABIR	18W17TH	25	10,000	104+34 LAL
. D	150	750	250+ 150 LABIR	26W/8T4	37	10,000	15=+30= LAB
, E	250	750	275 + 130 LAROR	2-43478	61	20,000	800+575 LAB
F	300	750	445 + 150 LARIA	2-F32/78	61	20,000	85+25-FM

Screening ANALYSIS

ે દંકાજે	KW SAVINGS	LABUR CAST	MATILLET	COST.	, -, , -	TOTAL 3]. INVKT.	BREAKEUEN HOWIS/ YEA	NOP AR
A	0.043	35	40	130	15	1185	1,070	
B	0.050	35	40	130	1.5	115	825	
۷	0.075	35	40	130	15	115	190	
D	0.113	44	60	181	15	166	220	
=	0.189	53	75	217	25	192	٥	•
F	0.239	Şa	75	217	25	192	Ó	

11 TOTAL LOST = (LABOR + MATIL) x 1.08 x 1.30 x 1.01 x 1.10 x 1.115

I BREAKEVEN OPHONES/YEAR = TOTAL ENVEKTMENT - (KW SAUMSS 2 108.60/kW x 11.70)

KW SAVINGS X 80,07454 x 11.70 + (RELAMD 8 - RELAMD 8)11.12

31 TOTAL INVESTMENT = TOTAL LOST - PGAE REBATE

NOTE! ANALYSIS SUMMARIES ON SHEETS 3 THROUGH 7
BETAILED ANALYSES PER RETROFIT TYPE: SHEETS 8 THROUGH 3
CATALOG CUTS: SHEETS 32 THROUGH 35

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY RCL	REPLACE INCANDESCENT	PROJECT FILL EEAP
CHECKED BY TANE 1973	LIGHTING WITH FLUORESCENT	
REV19	ECO #D4	SHEET NO. 2 OF 35 SHEETS

ADDITIONAL ASSUMPTIONS ARE AS KOLLOWS:

1. HOURS OF LAMP OPERATION BASED ON FIELD SURVEY DATA.

2 AMNUAL USAGE SAVINGS = NO. FIXTURES X KW SAVINGS/FIXT X OP HAS/ YR.

3. Annial NSAGE COST SAVINGS = KUH x # 0.07454

H. AMMAL OFM COST = OPHRS/MR X RELAMP COST EXKT - RELAMP COST MEAN LIFE EXIST

S. LCC SAVINGS = ANNUAL OFM WET SAVIGEX 11.12 +

AMNARI KWIT WST SAVINGS X 11.70 +

Annual KW COST SAVINGS X 11.70.

WHERE AMMAR KW LIST SAVINGS = ICM SAVINGS X 108.60

THE PROPOSED RETROFITS ARE DESCRIBED AS FOLLOWS!

ICETRAFITS A, B AND C: REPLACE EXISTING SURFACE MOUNTED INCAMDESCENT

FIXTURE WITH GO-100W LAMPS WITH COMPACT

FLYURESLENT FIRTARE WITH 13W/STY TO 18W/7TY LAMP

RETWENT D

RETROKIT EXISTING RECUSSED INLANDESCENT DOWNLIGHT (ISOW LAMP) WITH KLUDGESCENT RALLAST AND SOLKET ADAPTER FOR ZOW/8TY

QUAD LAMP.

BALLAST.

RETRUFIT E AND F

REPLACE EXISTING SUSPENDED IN CANDESCENT I SIXTURE (250-300W LAMPS) WITH INDUSTRIAL PENDANT - MOUNTED FLUURESCONT PIXTURE CINTATIONS 2 - F32/T8 LAMPS AND ELECTRONIC

ECO D-4 SHEET SOF 35

SUMMARY OF ECO D-4: REPLACE INCANDESCENT LIGHTING WITH FLUORESCENTS

ECO	SUMM	ARY OF EC	SUMMARY OF ECO D4 ANALYSES	SES								
No.	ب	Energy Savings	ings			O&M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kWH/Yr kW Demand Use \$/Yr	Use \$/Yr	Demand \$/Yr	\$/Yr	\$	₩	₩	\$	₩	
A: I-60W Savings	181	22,623	8	\$1,686	\$845	\$894	\$39,564	\$21,175	\$23,610	\$2,715	\$20,895	1.89
B: I-75W Savings	N	208	7.0	\$16	\$11	\$11	\$433	\$234	\$261	\$30	\$231	1.88
C: I-100W Savings	27	4,922	2	\$367	\$220	\$221	\$9,322	\$3,159	\$3,522	\$405	\$3,117	2.99
D: 1-150W Savings	31	7,286	4	\$543	\$380	\$219	\$13,243		\$5,607	\$465	\$5,142	2.58
E: 1-250W Savings	50	7,862	4	\$586	\$411	\$208	\$13,976		\$4,348	\$500	\$3,848	
F: I-300W Savings	8	4,124	ß	\$307	\$597	\$125	\$11,976	\$4,485	\$5,000	\$575	\$4,425	2.71
TOTALS	284	47,025	23	\$3,505	\$2,464	\$1,680	\$88,515	87	\$42,348	\$4,690	\$37,658	
	TOTAL	S'ONLY FC	FOTALS ONLY FOR BUILDINGS WITH SIR!	S WITH SIF	3's OVER 1.0							

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 4-of 35

ECO D4

•		descent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	tion Name: TOTAL te: March 1993	PROJECT	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
Allalysis Da	te. March 1990		20011011110 2110.		,	, repare the same of the same
1. Investmer			407.004	-		
A. Construc	tion Costs		\$37,981	-		
B. SIOH C. Design C	oot		\$2,089 \$2,279	-		
_	ost st (1A+1B+1C)		\$42,348	_		
	/alue of Existing Eq	uipment	4 / 2 , 0 10		\$0	
_	lity Company Reba				(\$4,690)	
	estment (1D-1E-1F)					
	avings (+)/Cost(-):			_		
Date of NIS	TIR 85-3273-X Used	for Discount Factors				
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84	160.5	\$3,50 5		11.70	- \$41,011
B. Dist	\$4.98	0.0	\$0 \$0		13.78	\$0 \$0
C. Propane	\$7.87	0.0 22.7 kV			14.16 11.70	\$28,828
D. Demand	\$108.60	22.1 KV	V \$2,404		11.70	920,020
E. Other F. Total			\$5,969	=		\$69,839
r. iotai			40,000			400,000
3. Non Ener	gy Savings (+) or 0	Cost (-):		_		
A Annual D	ecurring (+/-)		\$1,680			
	: Factor (Table A)		Ψ1,000	-	11.12	
` '	ed Savings/Cost (3	A x 3A1)				- \$18,677
(/	3 , (,				
B. Non Recu	urring Savings (+) o	or Cost (-)				
ltem	Savings(+)	Year of	Discount		Doscounted Sav	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.			_			-
b.			<u>.</u> .			-
c. d. Total				=		•
u. Totai						
C Total Non	Energy Discounted	i Savings (3A2+3Bd4)			\$18,677	
4. Simple Pa	ayback 1G/(2F3+3/	A+(3Bd1/Economic Life	≘)):		4.9	Years
•	Discounted Saving				\$88,515	
6. Savings to	o Investment Ratio	(SIR) 5/1G:			2.35	
7. Adjusted	Internal Rate of Ret	urn (AIRR):			10.10%	•

ECO DASHEET SOF35

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

Fac	SIR > 1.0 D4A		SIR > 1.0 D4B		SIR > 1.0 D4C	5 40	SIR > 1.0 D4D	Δ	SIR > 1.0 D4E	74 E	SIR V	SIR > 1.0 D4F	C HIS	SIR > 1.0 D4 All	7
o O	Energy Savings Energy KWH/Y KW Demand KWH/Y	nand	Energy Savings kWH/Y kW Demand	nand	Energy Savings kWH/Y kW Den	Savings kW Demand	Energy kWH/Y	gs emand	Savings Energy Savings kW Demand kWH/Y kW Den	Savings kW Demand		Energy Savings kWH/Y kW Demand		m	avings kW Demand
16			ı			0.2		•				1			0.2
P 41A		•	•	•	•	•	•	•	•						·
P 41B	•	•	•	•	•	•	•	•	•					•	•
P 42A	•	•	•	•	•	•	•	•	•		•				•
P 42B	•	•	•	•	•	•	•	1	•		•				•
P 43A		•		. 1		•		•	•		•		,	•	•
P 43B		•	•	•	•	•	•	•	•						•
P 44A		•	•	•	•	•	•	•	•		·				•
P 44B	•	•	•	•	•	•	•	•	•		•		•	•	•
P 45A	•	•	•	•		•	•	•	•					•	•
P 45B	•	•		•	•	•	•	•			•				٠
P 46	•	•		•	•	•	•	•	•		•		•	•	·
P 47	•	•	•	•	•	•	•	•	•		•		•	•	·
P 51A	•	•	•	٠	•	•	•	•	•		•		,		
P 51B	•	•	•	•		•	•	•			•				
P 52A	•	٠	•	•	•	•	•	•	•						
P 52B	•	•	•	•	•	•	•	•	•		•				
P 53	-•	•	•	•	•	•	•	•	•		•				
P 54	•	•		•	•	•	•	•	•		•			•	
P 55		•	•	•	•	•	•	•	•		•				
P 56		•	•	•	•	•	•	•	•		•				
P 57		•	•	•	•	•	•	•	•		•				
P 58		•	•	•	•	•	•	•	•		•	•			
P 59		•	•		•	•	•	•	•		•		•		
P 60		•	•	•	•	•	•	•	•		•			•	
S 79	•	•	•	•	•	•	•	•	•						
P 80	•	•	•	٠	8	0.2	•	•	•				,	86	0.2
P 81	•	•	•	•	•		•	•	•		- 783		. 8.4	783	4.8
P 101	•	•	•	•	•	•	•	•	•		•		•	•	
P 116	•	•	•	•	•	•	•	•	•					•	
120	1,803	4.0	•	•	349	0.1	•	•	•		- 3,341		0.7 5,	5,493	1.2
121	250	0.1	•	•	218	0.1	•	•	•					469	0.2
124	•	•	•	•	•	•	•	•	•		•				
127		6.0	•	•	3,123	1.0	•	•	•		•			6,016	6.
P 128		2.2	,	•	•	•	•	•	•					6,887	22
131	•	•	•	•	•	•	•	•	•						
144		,		•	•	•	•	•	•						

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

Elerety Savings Eln		SIR >	SIR > 1.0 D4A	SIR V	SIR > 1.0 D4B	SIR V	SIR > 1.0 D4C	SIR >	SIR > 1.0 D4D	SIR >	SIR > 1.0 D4E	ヘエジ	SIR > 1.0 D4F	ヘエジ	SIR > 1.0 D4 AII	
90 0.0 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.		Energy kWH/Y	/ Savings KW Deman	Energy d kWH/Y			_			Energy nd KWH/Y					1/1	nand
90 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	S 146															•
80 000	T 149	•		٠		99									98	0.1
1,046 0.6 1,046 1,	T 158	80		-		•									80	0.0
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	T 158	•	•	•		•	٠					•		•		•
1,046 0.6 1,046 429 0.1 1,046 413 413 413 413 413 413 413 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 1,041 413 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 0.1 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041 413 1,041		•	•	•		•	•	•				•				•
1,046 0.6 1 1,046 1,13		•	•	•		•	•	•							•	•
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1		•	•	•			·									•
1,046 0.6 1,1046		•	•	•		•	•					•				٠
1,046 0.6		•	•	•		•	•	•							•	•
1,046 0.6 1,046 1,		•	•	•		•	•	•							•	٠
1,046 0.6 1. 1,046		•	•	•		•	•					•				•
1,046 1,046	S 168	•	•	•		•	•	•				•				•
1,046 0.6		•	•	•			•					•		•	•	٠
1,046 0.6		•	1	•			,	•				•				1
1,046 0.6 1 1,046	178	•	•	•			•					•		•		•
1,046 0.6	182	•	•	•			•	•				•				•
1,046 0.6	186	•	•	•		•	•	•								•
1,046 0.6	190	_•	•	•		•	•	•		•		•		•		٠
429 0.11 · · · · · · · · · · · · · · · · · ·	S 187	1,046						•				•		- 1,0	46	0.6
429 0.1 · · · · · · · · · · · · · · · · · · ·		•	•	•		•	•	•		•		•				•
413 0.1		429				•	•	•				•		4	59	0.1
413 0.1	_	•	•	•		•		•		•		•			•	•
413 0.1 . <td></td> <td>•</td> <td>•</td> <td>•</td> <td></td> <td></td> <td></td> <td>•</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td>,</td> <td></td> <td>•</td>		•	•	•				•		•				,		•
413 0.1		413		•		•		•		•				4	13	0.1
413 0.1 . <td>_</td> <td>•</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td>•</td> <td></td> <td>•</td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td>•</td>	_	•		•				•		•		•				•
1,831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.831 1.7 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8 1.8		413		•		•		•		•		•		4	1 3	0.1
1,831 1.7 1. 1,1431 1.7 1. 1,1831 1.7 1. 1,1831 1.7 1. 1,1831 1.7 1. 1,1831 1.7 1. 1,1831 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.7 1.		•	,	•		•		•		•						•
413 0.1 1 <td></td> <td>1,831</td> <td>1.7</td> <td></td> <td></td> <td>•</td> <td>•</td> <td>•</td> <td></td> <td>•</td> <td></td> <td>1</td> <td></td> <td>1,8</td> <td>31</td> <td>1.7</td>		1,831	1.7			•	•	•		•		1		1,8	31	1.7
413 0.1		•	•	•		•	•	•		•		•		,		•
413 0.1		•	•	•			•	•				•				•
413 0.1		•	•	•		•	,	•				•			•	•
413 0.1 413 413 413 413 413		•	•	•		•	•	•		•		•		•		•
413 0.1		413		•		•		•						4	13	0.1
413 0.1	_	•	•	•		•	3	•		•		•				•
		413	0.1	•		•	j	•						4	13	0.1
		•	•	•		•	•	•				•			•	•
		•	•	•		•	•	•								•

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

Fac	SIR > 1.0 D4A	••	SIR > 1.0 D4B	0 D4B	SIR > 1.0 D4C	.o D4C	ヘエ の	SIR > 1.0 D4D	SIR	SIR > 1.0 D4E	NE NE	SIR > 1.0 D4F	D	SIR > 1.0 D4 All	Ď
Ö	Energy Savings kWH/Y kW Der	mand I	Energy Savings kWH/Y kW Den	Savings Energy Savings Energy KW Demand KWH/Y KW Demand KWH/Y	Energy kWH/Y	Energy Savings Energy kWH/Y kW Demand kWH/Y	Energ	Energy Savings kWH/Y kW Deman	Ener d KWH	Savings Energy Savings Energy Savings Energy S KW Demand kWH/Y kW Demand kWH/Y kW Demand kWH/Yr	Ener d kWH	Energy Savings kWH/Y kW Dema	an dr R	Energy Savings kWH/Yr kW Demand	·== =
S 236	•	•	•	•	•					•				•	ı
S 237	•	•	•	•	•	•				•				•	
\$ 238	•	•	•	•	•	•	7,286	3.5	10	•				7,286	
P 240	•	•	•	•	•	•				•		•		t	
S 241	•	•	•	•	•	•				•				•	
S 243	•	•	•	•	•	•				•		•		•	
S 244		٠	•	•	•	•			,					•	
S 246	•	•	•	•	•	•				•				•	
S 247		•	•	•	•	•				•		•		•	
P 252	89	0.0	•	•	•	•			- 3,538	38 1.7	7	•		3,628	
P 256	•	٠	208	0.1	•	•			- 393	33 0.2	ય			9	
P 259	83	0.0	•	•	•	•			- 3,931	31 1.9	G	•		4,021	
S 283	•	•	•	•	936	0.5						•	•	836	
S 286		•	•	•	•	•								٠	
P 287	•	•	•	•	•	•				•		•		٠	
S 288		•	•	•	•	•							•	•	
S 290	•	•	•	•	•	•				•	•	•		•	
S 291	161	0.1	•	•	•	•		•						161	
P 295	5,409	1.2	•	•	•	•								5,409	
P 301	٠.	•	•	•	•	•			,				•	•	
P 642	•	•	•	•	•	•						•		•	
S 2201		•	•	•	•					•		•		•	
TOTALS	22,623	7.8	508	0.1	4,922	2.0	7,286	3.5	5 7.862	3.8	8 4.124		5.5	47.025	

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

Fac	A: I-6	A: I-60W Savings										
Š		ш	vings			O&M		LCC Savings Construction	Total Cost	Rebate	Investment	SIR
- (Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$\ \$\	₩.	\$	\$	₩	₩	
1 e	5	376	4.0	\$28	\$47	\$14.85	\$1,039	\$1,170	\$1,304	\$150	\$1,154	0.90
P 41A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 43A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 43B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 47	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 51A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 51B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 52A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 52B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 53	•	0	0.0	\$0	\$0	\$0.00	\$0					
P 54	0	0	0.0	\$0	₩	\$0.00	\$0					
P 55	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 56	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 57	0	0	0.0	\$0	\$0	\$0.00	\$0					
	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 59	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 60	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 79	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 80	-	19	0.0	\$	\$5	\$0.74	\$79	\$117	\$130	\$15	\$115	0.69
P 81	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 101	212	2,986	9.1	\$223	066\$	\$118.07	\$15,500	\$24,802	\$27,654	\$3,180	\$24,474	0.63
P 116	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 120	တ	1,803	0.4	\$134	\$42	\$71.29	\$2,857	\$1,053	\$1,174	\$135	\$1,039	2.75
T 121	8	250	0.1	\$19	\$	\$9.90	\$438	\$234	\$261	\$30	\$231	1.90
T 124	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 127	2	2,892	0.9	\$216	\$98	\$114.35	\$4,942	\$2,457	\$2,739	\$315	\$2,424	2. 8
P 128	20	6,887	2.2	\$513	\$233	\$272.27	\$11,766	\$5,849	\$6,522	\$750	\$5,772	2. 2.
T 131	0	0	0.0	\$	\$0	\$0.00	\$0					
S 144	36	0	1.5	\$	\$168	\$0.00	\$1,967	\$4,212	\$4,696	\$540	\$4,156	0.47
					1						;	

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

No. Energy Savings 146 0 0 0 149 10 376 156 1 80 0 161 0 0 162 0 0 163 0 0 164 0 0 0 165 0 0 0 165 0 0 0 167 0 0 0 177 0 0 0 178 0 0 0 189 1 1,046 190 4 81 190 0 0 205 3 429 205 3 429 206 0 0 0 210 0 0 211 0 0 0 212 0 0 229 3 413 229 3 413					On market patient	Total Cost	Dohoto	Investment	ũ
Fxirs 146 0 10 156 1 1 161 0 161 162 0 162 163 164 177 0 165 165 177 177 0 165 166 167 168 0 167 168 0 167 168 0 167 168 0 168 0 169			∑ ŏ O	O&M LCC Savings Construction	Construction		חפטפום	Halinearii	Ē
146 0 0 0 149 10 376 158 1 80 0 0 164 158 0 0 0 0 165 165 0 0 0 0 165 165 0 0 0 0 165 165 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	and Use \$/Yr	Demand \$/Yr	\$/Yr	↔	₩	₩	\$	\$	
149 10 376 158 1 80 161 0 0 162 0 0 163 0 0 164 0 0 165 0 0 166 0 0 167 0 0 168 0 0 177 0 0 167 0 0 168 0 0 177 0 0 190 4 81 190 4 81 190 4 81 190 4 81 205 0 0 206 0 0 207 3 413 208 3 1,831 210 0 0 211 0 0 212 0 0 213 3 413 229 3 413 229 3 413 229 3 413 229 3 413 229 3 413 229 3 413 30 0	0\$ 00	\$0	\$0.00	0\$	Ś				
158 1 80 158 1 80 158 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3.4 \$28	\$47	\$14.85	\$1,039	\$1,170	\$1,304	\$150	\$1,154	0.90
158 0 0 0 165 0 0 0 165 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$5	\$3.18	\$160	\$117	\$130	\$15	\$115	1.39
161 0 0 0 162 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
165 0 0 0 165 0 0 0 165 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$	\$0.00	\$0					
165 0 0 0 165 0 0 165 0 0 0 0 165 0 0 0 0 165 0 0 0 0 172 0 0 0 0 0 182 0 0 0 0 0 188 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
165 0 0 0 165 0 0 165 0 0 0 0 165 0 0 0 0 172 0 0 0 0 177 0 0 0 0 0 182 0 0 0 0 0 188 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
165 0 0 0 166 0 0 167 0 0 0 0 177 0 0 0 0 177 0 0 0 0 178 0 0 0 0 188 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
166 0 0 0 1687 0 0 0 172 0 0 0 0 177 0 0 0 0 1788 0 0 0 0 0 1886 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
167 0 0 0 168 0 0 0 172 0 0 0 0 172 0 0 0 0 172 0 0 0 0 182 0 0 0 0 0 186 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
168 0 0 0 177 0 0 0 177 0 0 0 0 178 0 0 0 0 188 0 0 0 0 0 189 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
172 0 0 177 0 0 178 0 0 182 0 0 186 0 0 190 4 81 197 13 1,046 198 0 0 205 3 429 206 0 0 207 3 413 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 213 0 0 229 3 413 229 3 413 229 3 413	0.0	\$	\$0.00	0\$					
177 0 0 178 0 0 182 0 0 186 0 0 190 4 81 197 13 1,046 198 0 0 205 3 429 205 3 413 207 3 413 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 213 0 0 229 3 413 229 3 413 229 3 413	0.0	0\$	\$0.00	\$0					
178 0 0 0 182 0 0 0 186 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$				ër 4	
182 0 0 0 186 0 0 0 190 4 81 1,046 198 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$0					
186 0 0 0 190 4 81 190 7 4 81 1904 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$0.00	\$ 0					
190	0.0	0\$	\$0.00	0\$					
197 13 1,046 198 0 0 205 3 429 205A 0 0 207 3 413 208 3 413 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 0 230 3 413	0.2 \$6	\$19	\$3.22	\$325	\$468	\$522	\$60	\$462	0.70
198 0 0 205 3 429 206 0 0 207 3 413 207 3 413 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229 3 413 229 3 413	0.6 \$78	\$61	\$41.37	\$2,083	\$1,521	\$1,696	\$195	\$1,501	1.39
205 3 429 205A 0 0 206 0 0 207 3 413 207A 0 0 0 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 0		\$	\$0.00	\$0					
205A 0 0 0 206 0 0 207 3 413 413 208 0 0 0 0 208 209 39 1,831 212 0 0 0 211 0 0 0 229 0 0 229 0 3 413	07	\$14	\$16.97	\$727	\$351	\$391	\$45	\$346	2.10
206 0 0 0 207 3 413 207A 0 0 0 208 3 413 209 39 1,831 210 0 0 211 0 0 0 212 0 0 219 0 0 229 3 413 229A 0 0		\$0	\$0.00	\$0					
207 3 413 208 3 413 208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 3	0.0	\$0	\$0.00	\$0					
207A 0 0 0 208 3 413 209 39 1,831 210 0 0 211 0 0 0 219 0 0 229 3 413 229A 0 0 230 3 413	0,	\$14	\$16.34	\$706	\$351	\$391	\$45	\$346	2.04
208 3 413 209 39 1,831 210 0 0 211 0 0 212 0 0 229 3 413 229A 0 0		\$0	\$0.00	\$0					
208A 0 0 209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 0	0 7	\$14	\$16.34	\$100	\$351	\$391	\$45	\$346	2.04
209 39 1,831 210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 0	0.0	\$0	\$0.00	\$0					
210 0 0 211 0 0 212 0 0 219 0 0 229 3 413 229A 0 0	₩.	\$182	\$72.40	\$4,533	\$4,563	\$5,087	\$585	\$4,505	1.01
211 0 0 0 212 0 0 219 0 0 229 3 413 229A 0 0		\$0	\$0.00	\$0					
212 0 0 219 0 0 229 3 413 229A 0 0		\$0	\$0.00	\$0					
219 0 0 229 3 413 229A 0 0 230 3 413		\$0	\$0.00	\$					
229 3 413 229A 0 0 230 3 413	0.0	\$0	\$0.00	\$0					
229A 0 0 230 3 413	0 7	\$14	\$16.34	\$100	\$351	\$391	\$45	\$346	2.04
230 3 413		\$0	\$0.00	\$					
	***	\$14	\$16.34	\$200	\$351	\$391	\$45	\$346	202
P 230A 0 0 0.0		0\$	\$0.00	\$0					
S 235 0 0 0.0	0.0	9	\$0.00	\$0					

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

Fac	A: I-60	A: I-60W Savings										
ò		Energy Savings	vings			O&M	O&M LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kWH/Yr kW Demand	Use \$/Yr	\$/Yr Demand \$/Yr	\$/Yr	, ↔	₩	₩	₩	49	
S 236	0	0	0.0	\$0	0\$	\$0.00	\$0					
S 237	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 238	0	0	0.0	\$0	0\$	\$0.00	9					
P 240	0	0	0.0	\$0	0\$	\$0.00	0\$					
S 241	0	0	0.0	\$0	\$0	\$0.00	0\$					
S 243	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 244	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 246	0	0	0.0	\$0	\$0	\$0.00	0\$					
S 247	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 252	-	88	0.0	25	\$	\$3.54	\$172	\$117	\$130	\$15	\$115	1.49
P 256	0	0	0.0	\$0	\$	\$0.00	\$0					
P 259	-	83	0.0	25	\$5	\$3.54	\$172	\$117	\$130	\$15	\$115	1,49
S 283	0	0	0.0	0 \$	0\$	\$0.00	\$0					
S 286	0	0	0.0	\$0	\$	\$0.00	\$0					
P 287	ω	338	0.3	\$25	\$37	\$13.37	\$881	\$936	\$1,044	\$120	\$924	0.95
S 288	0	0	0.0	9	\$	\$0.00	\$					
S 290	0	0	0.0	9	\$0	\$0.00	\$					
S 291	Ø	161	0.1	\$12	6\$	\$6.36	\$320	\$234	\$261	\$30	\$231	1.39
P 295	27	5,409	1.2	\$403	\$126	\$213.86	\$8,571	\$3,159	\$3,522	\$405	\$3,117	2.75
P 301	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 642	0	0	0.0	\$	\$0	\$0.00	\$0					
\$ 2201	0	0	0.0	\$0	\$0	\$0.00	\$					
TOTALS	181	22,623	80	\$1,686	\$\$	\$894	\$39,564	\$21,175	\$23,610	\$2,715	\$20,895	1.89
	TOTA	LS ONLY F	TOTALS ONLY FOR BUILDINGS WI		TH SIR's OVER 1.0				•			

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/774

Fac	B: 1-7:	B: I-75W Savings	10									
Š		Energy Savings	ings			O&M	LCC Savings Con	Construction	Total Cost	Rebate	Investment	SIB
	Fxtrs	KWH/₹r	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	↔	₩	₩	↔	4	•
	0	0	0.0	\$	\$0	\$0.00	0\$					
P 41A	0	0	0.0	\$0	\$	\$0.00	9					
	0	0	0.0	Ş	\$0	\$0.00	9					
P 42A	0	0	0.0	\$0	\$	\$0.00	\$0					
P 42B	0	0	0.0	\$0	\$	\$0.00	9					
	0	0	0.0	\$0	\$0	\$0.00	0\$					
P 43B	0	0	0.0	Ç	\$0	\$0.00	O\$					
P 44A	0	0	0.0	Ş	\$0	\$0.00	O\$					
P 44B	0	0	0.0	\$0	\$0	\$0.00	9					
P 45A	0	0	0.0	\$	\$0	\$0.00	O\$					
	0	0	0.0	Ç	\$0	\$0.00	0 \$					
P 46	0	0	0.0	\$	\$0	\$0.00	•					
P 47	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 51A	0	0	0.0	\$	\$0	\$0.00	0\$					
P 51B	0	0	0.0	\$	\$0	\$0.00	0\$					
	0	0	0.0	0\$	\$0	\$0.00	0\$					
	0	0	0.0	\$	\$0	\$0.00	\$					
P 53		0	0.0	0 \$	\$0	\$0.00	\$0					
	0	0	0.0	\$0	\$0	\$0.00	9					
P 55	0	0	0.0	\$0	\$0	\$0.00	O\$					
P 56	0	0	0.0	\$	\$0	\$0.00	9					
P 57	0	0	0.0	\$0	\$0	\$0.00	0					
P 58	0	0	0.0	\$0	\$0	\$0.00	0\$					
P 59	0	0	0.0	\$0	\$0	\$0.00	₩					
P 60	0	0	0.0	Q	\$0	\$0.00	O\$					
	o	0	0.0	\$	\$0	\$0.00	0\$					
P 80	0	0	0.0	0\$	\$0	\$0.00	\$0					
P 81	12	86	9.0	\$7	\$65	\$5.31	206\$	\$1,404	\$1,565	\$180	\$1,385	0.65
	0	0	0.0	0 \$	\$0	\$0.00	\$0					
P 116	0	0	0.0	\$0	\$0	\$0.00	0\$					
T 120	0	0	0.0	\$	\$0	\$0.00	\$0					
T 121	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 124	0	0	0.0	\$	\$0	\$0.00	0 \$					
	0	0	0.0	\$	\$0	\$0.00	\$0					
P 128	0	0	0.0	\$	0\$	\$0.00	\$0					,
T 131	0	0	0.0	Ş	\$0	\$0.00	\$0					,
S 144	0	0	0.0	\$	\$0	\$0.00	\$0					
)F
												<u>ۍ</u> د
					200							;

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/7T4

Fac	B: I-75W Savings	Savings										
Š.	Enei	Energy Savings				O&M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs kV	kWH/Yr kW	kW Demand	Use \$/Yr	Demand \$/Yr	\$/ ⊀ r	\$	↔	₩	မှ	မ	
S 146	0	0	0.0	\$		\$0.00	\$0					
T 149	0	0	0.0	\$		\$0.00	\$0					
T 156	0	0	0.0	₩	0\$	\$0.00	\$0					
T 158	0	0	0.0	\$0	0\$	\$0.00	\$0					
T 161	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 162	0	0	0.0	\$	\$0	\$0.00	0\$					
T 163	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 164	0	0	0.0	\$ 0	\$0	\$0.00	\$0					
T 165	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 166	0	0	0.0	\$		\$0.00	\$0					
T 167	0	0	0.0	\$	0\$	\$0.00	\$0					
S 168	0	0	0.0	\$		\$0.00	\$0					
T 172	0	0	0.0	\$		\$0.00	\$0					
P 177	0	0	0.0	\$	\$	\$0.00	\$0				ئ د	
P 178	0	0	0.0	\$		\$0.00						
S 182	0	0	0.0	\$		\$0.00						
S 186	0	0	0.0	\$	\$0	\$0.00	\$0					
P 190	17	402	0.9	\$30	47	\$21.72	\$1,6	\$1,989	\$2,218	\$255	\$1,963	0.85
S 197	0	0	0.0	₩		\$0.00	\$0					
S 198	0	0	0.0	\$		\$0.00	\$0					
P 205	0	0	0.0	\$0		\$0.00	\$0					
P 205A	0	0	0.0	\$0		\$0.00	\$					
P 206	0	0	0.0	\$		\$0.00	\$0	2				E
P 207	0	0	0.0	\$	\$0	\$0.00	\$					CC.
P 207A	0	0	0.0	\$0		\$0.00						>
P 208	0	0	0.0	\$0	\$0	\$0.00	\$0					1
P 208A	0	0	0.0	₩		\$0.00						4
P 209	0	0	0.0	₩		\$0.00						•
P 210	0	0	0.0	\$		\$0.00						3
P 211	0	0	0.0	\$		\$0.00	\$0					H
P 212	0	0	0.0	\$		\$0.00						E£
P 219	0	0	0.0	\$0		\$0.00						eT.
P 229	0	0	0.0	\$		\$0.00		_				1
P 229A	0	0	0.0	₩		\$0.00						a
P 230	0	0	0.0	\$		\$0.00						0
P 230A	0	0	0.0	\$		\$0.00		_				F
S 235	0	0	0.0	₩	\$0	\$0.00	0 €					3
					•					•	4	5

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/7T4

Fac	H: 1-7	H: I-75W Savings	·n									
<u>.</u>		Energy Savings	rings			O&M	O&M LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kWH/Yr kW Demand	Use \$/Yr	Use \$/Yr Demand \$/Yr	\$/Yr	₩	49	₩	₩	69	
S 236	0	0	0.0	\$0		\$0.00	0\$	3				
S 237	0	0	0.0	\$0		\$0.00	\$0					
S 238	0	0	0.0	\$0		\$0.00	0\$					
P 240	0	0	0.0	\$0		\$0.00	0\$					
S 241	0	0	0.0	\$0		\$0.00	\$					
S 243	0	0	0.0	\$0		\$0.00	\$					
S 244	0	0	0.0	\$0		\$0.00	0\$					
S 246	0	0	0.0	\$0		\$0.00	\$					
S 247	0	0	0.0	\$		\$0.00	\$					
P 252	0	0	0.0	\$0		\$0.00	\$0					
P 256	~	208	0.1	\$16		\$11.23	\$433	\$234	\$261	\$30	\$231	1.88
P 259		0	0.0	\$0		\$0.00	\$0					
S 283	0	0	0.0	\$		\$0.00	\$0					
S 286	0	0	0.0	\$		\$0.00	\$0				*	
P 287	0	0	0.0	Q		\$0.00	0\$					
S 288	0	0	0.0	\$0		\$0.00	\$0					
S 290	0	0	0.0	\$0		\$0.00	0\$					
S 291	o	0	0.0	\$	\$	\$0.00	0\$					
P 295	0	0	0.0	\$		\$0.00	\$0					
P 301	0	0	0.0	\$0		\$0.00	\$0					
P 642	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 2201	0	0	0.0	\$0		\$0.00	\$0					
TOTALS	2	208	0	\$16		\$11	\$433	\$234	\$261	\$30	\$231	1.88
												֡

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT; I 100 W to 18W/7T4

Fac	ö	C: I-100W Savings	78									
Š		Energy Savings	ings			08M	LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kW Demand	Use	\$/Yr Demand \$/Yr	\$/ ∀ r	₩	₩	↔	↔	₩.	
T 6	8	131	0.2	\$10	\$16	\$5.88	\$370	\$234	\$261	\$30	\$231	1.60
P 41A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 43A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 43B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 44B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 47	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 51A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 51B	0	0	0.0	\$0	\$	\$0.00	\$					
P 52A	0	0	0.0	\$	0\$	\$0.00	\$0					
P 52B	0	0	0.0	\$	\$	\$0.00	\$0					
P 53	0	0	0.0	\$	\$	\$0.00	\$					
P 54	0	0	0.0	\$	Q	\$0.00	\$0					
P 55	0	0	0.0	\$	\$	\$0.00	\$0					
P 56	0	0	0.0	\$0	\$	\$0.00	\$0					
P 57	0	0	0.0	\$0	\$	\$0.00	\$0					
P 58	0	0	0.0	\$0	\$	\$0.00	\$0					
P 59	0	0	0.0	\$0	\$0	\$0.00	\$0				•	
P 60	0	0	0.0	\$0	\$	\$0.00	\$0					
S 79	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 80	က	86	0.2	25	\$24	\$4.41	\$421	\$351	\$391	\$45	\$346	1.21
P 81	0	0	0.0	Ş	\$0	\$0.00	\$0					
P 101	0	0	0.0	\$ 0	\$0	\$0.00	\$0					
P 116	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 120	-	349	0.1	\$26	\$8	\$15.69	\$574	\$117	\$130	\$15	\$115	4.98
T 121	-	218	0.1	\$16	\$8	\$9.80	\$395	\$117	\$130	\$15	\$115	3.42
T 124	0	0	0.0	\$	\$0	\$0.00	\$0					
T 127	13	3,123	1.0	\$233	₩.	\$140.19	\$5,522	\$1,521	\$1,696	\$195	\$1,501	3.68
P 128	0	0	0.0	\$0		\$0.00	0					
T 131	0	0	0.0	\$	\$0	\$0.00	\$0					
S 144	0	0	0.0	\$		\$0.00	\$0					

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1100 W to 18W/714

Fac	C: F10	C: I-100W Savings										
Š	u	Energy Savings				O&M	LCC Savings	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr kW Demand	Demand	Use \$/Yr	Demand \$/Yr	\$∕7	₩	€9	49	₩	€9	
S 146	0	0	0.0	\$0	0\$	\$0.00	\$0					
T 149	-	99	0.1	\$5	\$8	\$2.94	\$185	\$117	\$130	\$15	\$115	8.
T 158	0	0	0.0	\$	\$0	\$0.00	\$0					
T 158	0	0	0.0	₽	\$0	\$0.00	\$0					
T 161	0	0	0.0	Q	\$0	\$0.00	\$0					
T 162	0	0	0.0	9	\$0	\$0.00	O\$					
T 163	0	0	0.0	\$	\$	\$0.00	0\$					
T 164	0	0	0.0	\$	\$0	\$0.00	0\$					
T 165	0	0	0.0	0 \$	\$0	\$0.00	\$0					
T 166	0	0	0.0	0\$	\$0	\$0.00	\$0					
T 167	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 168	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 172	0	0	0.0	0 \$	\$0	\$0.00	\$0					
P 177	0	0	0.0	\$	\$0	\$0.00	\$0				4-	
P 178	0	0	0.0	Ç	\$0	\$0.00	\$0					
S 182	0	0	0.0	0	\$0	\$0.00	0\$					
S 186	0	0	0.0	0	\$0	\$0.00	\$0					
P 190	0	0	0.0	\$	\$	\$0.00	\$0					
S 197	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 198	0	0	0.0	\$	\$	\$0.00	\$0					
P 205	0	0	0.0	Q	\$	\$0.00	\$0					
P 205A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 206	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 208	0	0	0.0	\$	\$	\$0.00	\$0					
P 208A	0	0	0.0	Ş	\$	\$0.00	\$0					
P 209	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 210	0	0	0.0	\$	\$	\$0.00	\$0					
P 211	0	0	0.0	\$	\$0	\$0.00	\$0					
P 212	0	0	0.0	\$0	\$	\$0.00	\$0					
P 219	0	0	0.0	\$	\$0	\$0.00	\$0					
P 229	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 229A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 230	0	0	0.0	\$0	\$	\$0.00	\$0					
	0	0	0.0	\$	\$	\$0.00	\$0					
S 235	0	0	0.0	\$	\$0	\$0.00	\$0					

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1100 W to 18W/7T4

	-	Energy Savings	ings			O&M	LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
S 236 S 237	Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	\$/Yr Demand \$/Yr	\$/Yr	49	₩.	₩	₩	69	
S 237	0	0	0.0	\$0	\$0	\$0.00	0\$					
	0	0	0.0	₩	\$0	\$0.00	\$0					
S 238	0	0	0.0	₩	\$0	\$0.00	\$0					
P 240	0	0	0.0	\$	0\$	\$0.00	\$0					
S 241	0	0	0.0	\$	\$0	\$0.00	\$0					
S 243	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 244	0	0	0.0	₩	\$0	\$0.00	\$0					
S 246	0	0	0.0	\$	\$0	\$0.00	\$0					
S 247	0	0	0.0	0\$	\$0	\$0.00	\$0					
P 252	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 256	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 259		0	0.0	\$	\$0	\$0.00	\$0					
S 283	9	936	0.5	\$70	\$49	\$42.02	\$1,855	\$702	\$783	06 \$	\$693	2.68
S 286	0	0	0.0	\$	\$0	\$0.00	\$0					
P 287	0	0	0.0	9	\$0	\$0.00	\$0					
S 288	0	0	0.0	\$ 0	\$0	\$0.00	\$0					
S 290	0	0	0.0	\$0	\$	\$0.00	\$0					
S 291	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 295	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 301	0	0	0.0	\$0	\$	\$0.00	\$0					
P 642	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 2201	0	0	0.0	\$0	\$0	\$0.00	\$0					
TOTALS	27	4,922	2	\$367	\$220	\$221	\$9,322	\$3,159	\$3,522	\$405	\$3,117	2.99
	TOTAL	SONLYF	TOTALS ONLY FOR BUILDINGS WITH SIR'S OVER 1.0	S WITH SIF	3's OVER 1.0							

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

Fac	D: -1	D: 1-150W Savings										
o N		Energy Savings	sbi			08M	CC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs		kWH/Yr kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	49	49	မ	↔	မာ	
1 6	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41A	0	0	0.0	\$0	Ş	\$0.00	%					
P 41B	0	0	0.0	\$0	Ş	\$0.00	0\$					
P 42A	0	0	0.0	\$	S	\$0.00	%					
P 42B	0	0	0.0	\$	Ş	\$0.00	\$0					
P 43A	0	0	0.0	\$0	\$ 0	\$0.00	\$0					
P 43B	0	0	0.0	\$0	0\$	\$0.00	0\$					
P 44A	0	0	0.0	\$0		\$0.00	0 \$					
P 44B	0	0	0.0	\$		\$0.00	\$					
P 45A	0	0	0.0	\$0	\$	\$0.00	\$0					
P 45B	0	0	0.0	\$0		\$0.00	\$0					
P 46	0	0	0.0	\$		\$0.00	\$ 0					
P 47	0	0	0.0	\$		\$0.00	\$0					
P 51A	0	0	0.0	\$0		\$0.00	\$ 0				***	
P 51B	0	0	0.0	\$0		\$0.00	0\$					
P 52A	0	0	0.0	\$0		\$0.00	\$0					
P 52B	0	0	0.0	S S		\$0.00	\$0					
P 53	• 	0	0.0	\$		\$0.00	0\$					
P 54	0	0	0.0	\$0		\$0.00	\$0					
P 55	0	0	0.0	\$0		\$0.00	\$0					
P 56	0	0	0.0	₽	\$0	\$0.00	\$					
P 57	0	0	0.0	\$		\$0.00	\$ 0					
P 58	0	0	0.0	\$0		\$0.00	\$0					
P 59	0	0	0.0	\$0		\$0.00	0\$					
P 60	0	0	0.0	\$		\$0.00	\$0					
S 79	0	0	0.0	\$		\$0.00	\$0					
P 80	0	0	0.0	\$0		\$0.00	\$0					
P 81	0	0	0.0	\$		\$0.00	0\$					
P 101	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 116	0	0	0.0	\$0	\$0	\$0.00	\$					
T 120	0	0	0.0	\$	\$0	\$0.00	\$					
T 121	0	0	0.0	0\$	\$0	\$0.00	\$0					
T 124	0	0	0.0	₩		\$0.00	0\$					
T 127	0	0	0.0	₩		\$0.00	\$					
P 128	0	0	0.0	₩	\$0	\$0.00	\$0					
T 131	0	0	0.0	\$		\$0.00	\$0					
S 144	0	0	0.0	₩	\$0	\$0.00	♀					

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

Fac	∃	D: I-150W Savings										
Š		Energy Savings	gs			O&M		LCC Savings Construction	Total Cost	Rebate	Investment	S.
	Fxtrs	KWH/Yr K	kW Demand	Use \$/Yr	Demand \$/Yr	\$/₹	<i>₩</i>	₩	€9	₩	·	
S 146	0	0	0.0	\$0	S S	\$0.00	0\$					
T 149	0	0	0.0	\$	\$0	\$0.00	\$0					
T 156	0	0	0.0	\$	\$0	\$0.00	\$0					
T 158	က	0	0.3	\$0	\$37	\$0.00	\$431	\$487	\$543	\$45	\$498	0.87
T 161	0	0	0.0	\$	\$0	\$0.00	0\$		}	2	•	5
T 162	0	0	0.0	\$0	9	\$0.00	\$0					
T 163	0	0	0.0	\$0	\$0	\$0.00	₩					
T 164	0	0	0.0	\$0	\$0	\$0.00	9					
T 165	0	0	0.0	\$	\$0	\$0.00	9					
T 166	0	0	0.0	\$	\$0	\$0.00	\$0					
T 167	0	0	0.0	9	\$0	\$0.00	\$0					
S 168	-	0	0.1	\$	\$12	\$0.00	\$144	\$162	\$181	\$15	\$166	0.87
T 172	0	0	0.0	\$	\$0	\$0.00	0\$		•		}	
P 177	0	0	0.0	\$0	\$0	\$0.00	\$0					
	0	0	0.0	\$0	\$0	\$0.00	0\$					
S 182	0	0	0.0	\$0	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$0					
P 190		0	0.0	\$	\$0	\$0.00	\$0					
S 197	0	0	0.0	\$	\$	\$0.00	\$0					
S 198	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 206	0	0	0.0		\$0	\$0.00	\$0					
P 207	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 209	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 210	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 211	0	0	0.0	0 \$	\$0	\$0.00	\$0					
P 212	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 219	0	0	0.0	\$	\$0	\$0.00	9					
	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 229A	0	0	0.0	\$0	\$0	\$0.00	\$					
P 230	0	0	0.0	\$0	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$	\$0.00	\$0					
S 235	0	0	0.0	\$0	\$0	\$0.00	\$0					

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

No. Fxt 236 237 240 244 246 247 252 259 259 259 259 259 259 259 259 259	Savings									
Extrs 236 0 0 237 0 0 240 0 0 244 0 0 245 252 0 0 256 0 0 259				O&M	O&M LCC Savings Construction	Sonstruction	Total Cost	Rebate	Investment	SIR
236 0 240 241 0 244 0 244 0 245 255 0 259	Yr kW Demand	Use	\$/Yr Demand \$/Yr	\$/√₽	₩	₩	4	₩	49	
237 0 238 31 240 0 241 0 243 0 244 0 247 0 252 0	0 0	0.0	0\$	\$0.00	0\$					
238 31 240 0 241 0 243 0 244 0 246 0 245 0 252 0	0	0.0	\$	\$0.00	0\$					
240 241 244 246 246 247 252 252 259	3.5	5 \$543	\$380	\$219.23	\$13,243	\$5,029	\$5,607	\$465	\$5,142	2.58
241 243 244 246 247 252 252 259	0	0.0	0\$	\$0.00	\$0				•	
243 244 246 247 252 259	0	0.0	\$ 0	\$0.00	\$0					
244 246 2247 252 256 259	0	0.0	0\$	\$0.00	\$0					
247 252 256 259	0	0.0	\$0	\$0.00	\$0					
252 252 256 256	0	0.0	\$0	\$0.00	\$0					
252 256 259	0	0.0	\$0	\$0.00	0\$					
256 259	0	0.0	\$0	\$0.00	0\$					
259	0	0.0	\$0	\$0.00	\$0					
	0	0.0	\$0	\$0.00	\$0					
S 283 0	0	0.0	\$0	\$0.00	\$0					
S 286 0	0	0.0	\$0	\$0.00	\$0					
P 287 0	0	0.0	\$0	\$0.00	\$0					
S 288 0	0	0.0	\$0	\$0.00	\$0					
\$ 290 0	0	0.0	\$0	\$0.00	\$0					
S 291 0	0 0	0.0	\$0	\$0.00	\$0					
P 295 0	0	0.0	\$0	\$0.00	\$0					
P 301 0	0 0	0.0	\$0	\$0.00	\$0					
P 642 0	0	0.0	\$0	\$0.00	\$0					
S 2201 0	0 0	0.0	\$0	\$0.00	\$0					
TOTALS 31 7,286	586	4 \$543	\$380	\$219	\$13,243	\$5,029	\$5,607	\$465	\$5,142	2.58
TOTALSON	TOTALS ONLY FOR BLILL DINGS WITH SID'S OVER 1 O	IN HEIM SON	OVED 1.0							

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

Fac	E: 1-250V	E: 1-250W Savings										
ò	En	Energy Savings				O&M	LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs k	kWH/Yr kW	kW Demand	Use \$/Yr	Demand \$/Yr	\$∕⊀	. •	₩.	₩:	₩	₩	
T 6	0	0	0.0	\$	\$0	\$0.00	0\$				•	
P 41A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 41B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 42A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 42B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 43A	0	0	0.0	\$	0\$	\$0.00	0 \$					
P 43B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 44B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 45B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$	0\$	\$0.00	0\$					
P 47	0	0	0.0	\$	0\$	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$0				a.	
P 51B	0	0	0.0	₩	O\$	\$0.00	0\$					
P 52A	0	0	0.0	0\$	O\$	\$0.00	\$					
	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 53	0	0	0.0	\$0	0\$	\$0.00	0\$					
P 54	0	0	0.0	\$	O\$	\$0.00	\$0					
P 55	0	0	0.0	Q	\$0	\$0.00	\$0					E
	0	0	0.0	Ş	\$0	\$0.00	\$0					Œ
	0	0	0.0	₽	\$0	\$0.00	\$ 0					2
P 58	0	0	0.0	\$	\$0	\$0.00	\$0					I
P 59	0	0	0.0	\$0	\$0	\$0.00	\$0) 4
P 60	0	0	0.0	\$	\$0	\$0.00	\$0					1
S 79	0	0	0.0	\$	\$0	\$0.00	\$0					•
	0	0	0.0	\$	\$0	\$0.00	\$0					5 /
	0	0	0.0	\$	\$0	\$0.00	\$0					1 (
P 101	0	0	0.0	0	\$0	\$0.00	\$0					E
P 116	0	0	0.0	\$	\$	\$0.00	0\$					Τ
T 120	0	0	0.0	\$0	0 \$	\$0.00	\$0					,
T 121	0	0	0.0	\$0	\$0	\$0.00	\$0					30
T 124	0	0	0.0	\$0	\$0	\$0.00	\$0					•
T 127	0	0	0.0	\$0	\$0	\$0.00	\$0) F
P 128	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 131	0	0	0.0	Q	\$0	\$0.00	\$0					35
S 144	0	0	0.0	Q	\$0	\$0.00	\$0					•

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

No. 1146 1149 1156 1156 1162 1163	(0)	Energy Savings kWH/Yr kW	ings kW Demand	:		0&M		C 1040 F	Rebate	facatacid	S
5 146 7 149 7 156 7 158 7 161 7 162 7 163	1		M Demand				LCC Savinds Construction				
5 146 1 149 1 156 1 161 1 162 1 164	c	c	ע כוומו זל	Use \$/Yr	Demand \$/Yr	` \$`	()	49	49	4	•
7 149 7 156 7 161 7 162 7 163 7 164	>	>	0.0	\$0	O\$	\$0.00	\$0				
7 156 7 161 7 162 7 163 7 164	0	0	0.0	\$0	\$0	\$0.00	0\$				
1 158 1 161 1 162 1 163	0	0	0.0	\$	\$0	\$0.00	0\$				
T 161 T 162 T 163 T 164	0	0	0.0	\$0	\$0	\$0.00	\$0				
1162 1163 1164	0	0	0.0	\$	\$0	\$0.00	0%				
1183 1184 1	0	0	0.0	Q	\$0	\$0.00	\$0				
T 164 T 165	0	0	0.0	\$0	\$0	\$0.00	0\$				
T+GE	0	0	0.0	\$0	\$0	\$0.00	O\$				
3	0	0	0.0	\$	\$0	\$0.00	O\$				
T 166	0	0	0.0	\$	\$0	\$0.00	049				
T 167	0	0	0.0	\$0	\$0	\$0.00	. 6				
S 168	0	0	0.0	\$	\$	\$0.00	09				
T 172	0	0	0.0	\$	0\$	\$0.00	. .				
P 177	0	0	0.0	\$	0\$	\$0.00	. G				
P 178	0	0	0.0	\$0	\$	\$0.00	Ç. G				
	0	0	0.0	\$0	\$0	\$0.00	· %				
S 186	0	0	0.0	\$	\$0	\$0.00	0\$				
	0	0	0.0	\$0	\$	\$0.00	. 6				
S 197	0	0	0.0	\$0	\$0	\$0.00	\$0				
S 198	0	0	0.0	\$0	\$0	\$0.00	0\$				
P 205	0	0	0.0	\$	\$0	\$0.00	0\$				
	0	0	0.0	Ç,	\$	\$0.00	0\$				
P 206	0	0	0.0	\$	\$0	\$0.00	\$0				
P 207	0	0	0.0	\$	\$	\$0.00	0\$				
P 207A	0	0	0.0	\$	\$0	\$0.00	\$0				
P 208	0	0	0.0	Ş	0\$	\$0.00	0\$				
P 208A	0	0	0.0	Ç	\$0	\$0.00	0\$				
P 209	0	0	0.0	Ç	\$0	\$0.00	O.				
	0	0	0.0	\$	\$0	\$0.00	O. W				
P 211	0	0	0.0	\$	\$0	\$0.00	O S				
P 212	0	0	0.0	\$	\$0	\$0.00	O.S				
	0	0	0.0	Ş	\$0	\$0.00	O 69				•
P 229	0	0	0.0	Ş	\$0	\$0.00	0\$				
	0	0	0.0	\$	\$0	\$0.00	0\$				•
	0	0	0.0	\$	\$0	\$0.00	0\$				•
	0	0	0.0	\$	\$0	\$0.00	0\$				
S 235	0	0	0.0	\$	\$	\$0.00	. (•

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

No.	Fac	E:	E: 1-250W Savings	gs									
FXITS KWHYYY KW Demand Use \$YY\$ \$YY\$ \$\$ <t< th=""><th>Š</th><th></th><th>Energy Sav</th><th>vings</th><th></th><th></th><th>O&M</th><th>LCC Savings</th><th>Construction</th><th>Total Cost</th><th>Rebate</th><th>Investment</th><th>SIR</th></t<>	Š		Energy Sav	vings			O&M	LCC Savings	Construction	Total Cost	Rebate	Investment	SIR
Color Colo		Fxtrs	kWH/Yr			Demand \$/Yr		₩.	49	₩	↔	49	
0 0 0.0 \$0 \$0.00 \$	\$ 236	0	0	0.0	\$0	0\$	\$0.00	\$0					
0 0 0 \$0 <td>S 237</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 237	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.0 \$0 \$0.0 \$0.0 \$0 \$0.0	\$ 238	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 \$0 <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 \$0 <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>0\$</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	\$0	0\$	\$0.00	\$0					
0 0 \$0 <td>S 243</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 243	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0 0 0 0 80 80 80 80 80 80 80 80 80	S 244	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0 0 80 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$1		0	0	0.0	\$	\$0	\$0.00	\$0					
9 3,538 1.7 \$264 \$185 \$63.72 \$6,289 \$1,755 \$1,957 \$225 \$1,732 1 3,931 1.9 \$293 \$21 \$698 \$1,950 \$217 \$25 \$1,924 10 3,931 1.9 \$293 \$205 \$104.14 \$6,988 \$1,950 \$2174 \$250 \$1,924 0 0 0 0 \$0 \$0 \$0 \$0 \$1,924	S 247	0	0	0.0	\$0	\$0	\$0.00	\$0					
10 3,931 1.9 \$293 \$205 \$104.14 \$6,988 \$11,950 \$2177 \$256 \$1924 10 3,931 1.9 \$293 \$205 \$104.14 \$6,988 \$11,950 \$2,174 \$250 \$1,924 0 0 0 0 0 0 0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	P 252	6	3,538	1.7	\$264	\$185	\$93.72	\$6,289	\$1,755	\$1,957	\$225	\$1,732	3.63
10 3,831 1.9 \$293 \$205 \$104.14 \$6,988 \$1,950 \$2,174 \$250 \$1,924 0 0 0.0 \$0	P 256	-	333	0.2	\$29	\$21	\$10.41	669\$	\$195	\$217	\$25	\$192	3.63
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0 \$0 \$0	P 259	0	3,931	9.1	\$293	\$205	\$104.14	\$6,988	\$1,950	\$2,174	\$250	\$1,924	3.63
0 0 0.0 \$0 \$0.00 \$	S 283	0	0	0.0	\$0	\$0	\$0.00						
0 0 0.0 \$0 \$0.00 \$	S 286	0	0	0.0	\$0	\$0	\$0.00	\$					
0 0 0.0 \$0 \$0.00 \$	P 287	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 \$0 0 0 0.0 \$0 \$0.00 \$0 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0.00 \$0 \$0 1 0 0.0 \$0.00 \$0 \$0 2 0 7,862 4 \$586 \$411 \$208 \$13,976 \$3,900 \$4,348 \$500 \$3,848 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	S 288	0	0	0.0	\$0	\$0	\$0.00						
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 1 0 0 0 \$0 \$0 2 0 7,862 4 \$586 \$413.976 \$3,900 \$4,348 \$500 \$3,848	S 290	0	0	0.0	\$0	0\$	\$0.00	\$					
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0 \$0.00 \$0 1 0 0.0 \$0.00 \$0.00 \$0.00 \$0.00 1 0 0 0.0 \$0.00 <td>291</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>0\$</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	291	0	0	0.0	\$0	0\$	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 \$0.00 1 0 0 0 \$0 \$0.00 \$0 \$0.00 2 20 7,862 4 \$586 \$411 \$208 \$13,976 \$3,900 \$4,348 \$500 \$3,848 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	P 295	0	0	0.0	\$0	\$0	\$0.00						
1 0 0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 -S 20 7,862 4 \$586 \$411 \$208 \$13,976 \$3,900 \$4,348 \$500 \$3,848 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	P 301	0	0	0.0	\$0	\$ 0	\$0.00						
0 0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 \$0.00 \$0 \$0.00 \$0 \$0.00 \$	P 642	0	0	0.0	\$0	\$0		\$0					
20 7,862 4 \$586 \$411 \$208 \$13,976 \$3,900 \$4,348 \$500 \$3,848 TOTALS ONLY FOR BUILDINGS WITH SIR'S OVER 1.0	\$ 2201	0	0	0.0	0\$			\$0					
	TOTALS	20	7,862	4	\$586			\$13,976	\$3,900	\$4,348	\$500	\$3,848	3.63
		TOTA	SONLYF	ENIC ILUB ACT	S WITH SI	7's OVER 1 D							

ECO D-4F REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1300 W to 2 x F32/T8

	SIR																						E	E		,	D	4	-	1.82	H	E	7 8:28 7	2	.3	0	F	
	Investment																													\$3,848			\$577					
	Rebate	₩																												\$500			\$75					
	Total Cost	₩																												\$4,348			\$652					
	Construction	↔																												\$3,900			\$585					
	O&M LCC Savings Construction	↔	0\$	0\$	\$	\$	\$	\$0	\$0	\$0	\$0	\$0	\$ 0	\$0	0\$	\$0	\$0	\$0	\$	\$0	\$0	\$0	\$ 0	\$0	\$0	\$0	0\$	0 \$	0\$	\$7,021	\$0	\$0	\$4,955	\$0	\$0	\$0	\$0	
	O&M	\$/√r	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$23.83	\$0.00	\$0.00	\$101.66	\$0.00	\$0.00	\$0.00	\$0.00	
		Demand \$/Yr	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	9	9	\$	\$0	9	\$	\$	\$	9	\$	\$ 0	9	\$0	\$0	\$0	\$0	\$0	\$519	\$0	\$0	\$78	\$0	\$	\$0	\$0	
		Use \$/Yr	₩	0 \$	\$	Q	\$	\$	\$0	\$0	\$	\$0	\$0	\$0	\$	\$	\$0	\$	\$0	\$	\$	\$	\$	\$0	\$	\$0	\$0	\$	\$	\$28	\$	\$0	\$249	\$0	\$0	\$	\$0	•
	sf	kWH/Yr kW Demand	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.7	0.0	0.0	0.0	0.0	
F: I-300W Savings	Energy Savings	KWH/Yr K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	783	0	0	3,341	0	0	0	0	
F: 1-30	ш	Fxtrs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	o	0	0	0	0	0	0	0	0	0	8	0	0	ო	0	0	0	0	
Fac	Š		T 6	P 41A	P 41B	P 42A	P 42B	P 43A	P 43B	P 44A	P 44B	P 45A	P 45B	P 46	P 47		P 51B	P 52A	P 52B		P 54	P 55		P 57	P 58	P 59	P 60	S 79	Р 80	Р 81	P 101	P 116	T 120	T 121		T 127	P 128	

Fac	F. 15	F: I-300W Savings										
Š		Energy Savings	gs			O&M	LCC Savings	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr kW Demand	W Demand	Use \$/Yr	Demand \$/Yr	\$/₹	₩	₩	€9	₩	€>	
S 146	0	0	0.0	0\$	0\$	\$0.00	0\$					
T 149	0	0	0.0	\$	\$0	\$0.00	\$0					
T 156	0	0	0.0	\$	9	\$0.00	\$0					
T 158	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 161	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 162	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 163	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 164	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 165	0	0	0.0	\$0	\$	\$0.00	\$					
T 166	0	0	0.0	\$	\$0	\$0.00	\$0					
T 167	0	0	0.0	\$	\$0	\$0.00	\$0					
S 168	0	0	0.0	\$	\$0	\$0.00	\$0					
T 172	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 177	0	0	0.0	\$0	\$	\$0.00	\$0					
P 178	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 182	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 186	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 190	•	0	0.0	\$0	\$0	\$0.00	\$0					
S 197	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 198	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 205	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 206	0	0	0.0		\$0	\$0.00	\$0					
P 207	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 209	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 210	0	0	0.0	\$	\$0	\$0.00	\$0					
P 211	0	0	0.0	\$	\$0	\$0.00	\$0					
P 212	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 219	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 229	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 229A	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 230	0	0	0.0	\$0	\$	\$0.00	\$0					
	0	0	0.0	\$0	\$	\$0.00	\$0					
S 235	0	0	0.0	\$0	\$0	\$0.00	\$0					

ECO D-4F REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1300 W to 2 x F32/T8

No. Frietry Savings Construction Total Cost wings Construction Construction Total Cost wings Construction Construction<	Fac	F3	F: I-300W Savings	Js.									
FXITS WMHYPYT WM Demand Use \$YYT \$YY	ġ Ż		Energy Sav	ings			0&M	LCC Savings	Construction	Total Cost	Rebate	Investment	SIR
0 0 0 0.0 \$0 \$0.00 \$0 \$0 000 \$		Fxtrs		kW Demand	Use \$/Yr	Demand \$/Yr	\$∕₹	₩	₩	€	49	so.	
0 0 0.0 \$0 \$0.00 \$		0	0	0.0	\$0	\$0	\$0.00	\$0					
1		0	0	0.0	\$0	\$	\$0.00	\$0					
0 0 \$0 <td>S 238</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td>\$0</td> <td>\$0.00</td> <td>0\$</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 238	0	0	0.0	\$	\$0	\$0.00	0\$					
0 0 0 0 0.0 \$0.0 \$0.0 \$0.0 \$0.0 \$0.0 \$0		0	0	0.0	\$0	0 \$	\$0.00	\$					
1		0	0	0.0	0 \$	\$0	\$0.00	\$					
0 0 0 0 0 0 0 80 80 80 80 80 80 80 80 80		0	0	0.0	\$0	\$0	\$0.00	O\$					
0 0 0 0 0 0 0 80 80 80 80 80 80 80 80 80		0	0	0.0	\$0	\$0	\$0.00	0\$					
0 0 0 0 0 0 80 \$0.00 \$0 80 0 0 0 80 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0 0.0 \$0 \$0.0 \$0 \$0 0.0 \$0 0 0 0 0	S 247	0	0	0.0	\$0	\$	\$0.00	\$0					
0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0 0 0 \$0 \$0 0 0 0 0 0 \$0 \$0 0 0 0 0	P 252	0	0	0.0	\$	\$	\$0.00	0\$					
0 0 0 0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	P 256	0	0	0.0	\$0	\$	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 \$0 0.0 \$0 \$0 0.0 \$0 \$0 0.0 \$0 \$0 0.0 \$0 \$0 \$0 0.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0	P 259	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$	S 283	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$	S 286	0	0	0.0	Q	\$	\$0.00	\$0				e- -	
0 0 0.0 \$0 \$0.00 \$		0	0	0.0	\$0	\$	\$0.00	8					
0 0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0.00 \$0 0 0.		0	0	0.0	\$	0\$	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 \$0 \$0.00 \$0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0.00 \$0 0 0 0 0 0 \$0.00 \$0 0 0 0 0 0 0 0 0 \$0.00 \$0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$	\$	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 S 23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000 \$575 \$4,425		•	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 80 \$0.	P 295	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 S 23 4,124 5 \$307 \$125 \$11,976 \$4,485 \$5,000 \$575 \$4,425 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	P 301	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 S 23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000 \$575 \$4,425 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	P 642	0	0	0.0	\$0	\$0	\$0.00	\$					
23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000 \$575 \$4,425 TOTALS ONLY FOR BUILDINGS WITH SIR's OVER 1.0	S 2201	0	0	0.0	0\$	\$0	\$0.00	\$0					
	TOTALS	ឌ	4,124	2	\$307	\$597	\$125	\$11,976	\$4,485	\$5.000	\$575	\$4.425	2.71
		TOTA	SONLYF	OR BUILDING	S WITH SIR	S OVER 1.0		•		•		•	

Region No. 4

Fort Hunter Liggett, California

Location:

Sheet of 35

Project No. 16-403-10

GANNON

Project Title	· I IGHTING - Incar	ndescent to Fluoresc	ent			Fiscal Year FY96
•	rtion Name: A. I60\					
	te: March 1993		Economic Life:	15 Y	EARS	Preparer: KELLER & C
1. Investme	nt Costs			_		
A. Construc	tion Costs		\$21,175	_		
B. SIOH			\$1,165	_		
C. Design C	Cost		\$1,270	_		
D. Total Co	st (1A+1B+1C)		\$23,610	_		
E. Salvage	Value of Existing E	quipment		_	\$0	
F. Public Ut	ility Company Reb	ate			(\$2,715)	
G. Total Inv	estment (1D-1E-1F	()				\$20,895
2 Energy S	avings (+)/Cost(-):					
		d for Discount Factor	s	-		
Energy	Cost	Saving	Annual \$	r	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		actor(4)	Savings(5)
A. Elec.	\$21.84	77.2	\$1,686		11.70	\$19,729
B. Dist	\$4.98	0.0	\$0		13.78	\$0
C. Propane	\$7.87	0.0	\$0		14.16	\$0
D. Demand	\$108.60	7.8	kW \$845		11.70	\$9,889
E. Other						
F. Total			\$2,532			\$29,619
3. Non Ener	rgy Savings (+) or	Cost (-):		_		
A. Annual R	lecurring (+/-)		\$894			
	t Factor (Table A)				11.12	
(2) Discoun	ted Savings/Cost (3A x 3A1)		_		\$9,945
B. Non Rec	urring Savings (+)	or Cost (-)				
ltem	Savings(+)	Year of	Discount		oscounted Sav	
	Cost(-)(1)	Occur. (2)	Factor(3)	iı	ngs(+)Cost(-)(4)	
a.				_		
b.						-
c. d. Total				_ =	THE SHEET IN THE SHEET	•
C Total Nor	n Energy Discounte	ed Savings (3A2+3Bd	(4)		\$9,945	
4. Simple P	ayback 1G/(2F3+3	3A+(3Bd1/Economic	Life)):		6.1	Years
•	Discounted Saving		•		\$39,564	
					1.00	
U. Javirius l	o Investment Ratio	(SIR) 5/1G:			1.89	

Sheet of 35

		ndescent to Fluoresce	Region No. 4 nt		Project No. 16-403-10 Fiscal Year FY96
	ion Name: B. I75V e: March 1993	N to 18W//14	Economic Life:	: 15 YEARS	Preparer: KELLER & GANNOI
1. Investment			\$234		
A. Constructi	on Costs		\$13		
B. SIOH			\$14		
C. Design Co			\$261		
	(1A+1B+1C)	i	φευι	\$0	
-	alue of Existing E			(\$30)	
	ity Company Reb			(400)	 \$231
G. Total inve	stment (1D-1E-1F)	,			7-2 ·
2. Energy Sa	vings (+)/Cost(-):				
Date of NIST	IR 85-3273-X Used	d for Discount Factors			
Energy	Cost	Saving	Annuai \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
	\$21.84	0.7	\$16	11.70	\$181
A. Elec.	\$4.98	0.0	\$0	13.78	\$0
B. Dist	\$7.87	0.0	\$0	14.16	\$0
C. Propane	\$108.60		kW \$11	11.70	 \$127
D. Demand	\$100.00		NTT WIT		
E. Other F. Total			\$26		\$308
3. Non Energ	y Savings (+) or	Cost (-):			
A. Annual Re			\$11		
	Factor (Table A)			— _{11.12}	
	ed Savings/Cost (3A x 3A1)			 \$125
. ,	_				
B. Non Recu	rring Savings (+)	or Cost (-)			
ltem	Savings(+)	Year of	Discount	Doscounted S	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-))(4)
a.			÷.		
b.					
C.					
d. Total					
C Total Non	Energy Discounte	ed Savings (3A2+3Bd4	!)	\$125	
		A+(3Bd1/Economic L	.ife)):		5.1 Years
	Discounted Saving			\$4:	
	Investment Ratio			1.8	
7. Adjusted I	nternal Rate of Re	eturn (AIRR):		8.4	6%

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28 35

	Fort Hunter Ligge LIGHTING - Incand ion Name: C. I100V	descent to Fluorescent	Region No. 4			Project No. Fiscal Year	16-403-10 FY96
	e: March 1993	10 1011/11	Economic Life:	15	YEARS	Preparer: K	ELLER & GANNON
E. Salvage Va F. Public Utili	on Costs	·	\$3,159 \$174 \$190 \$3,522	- - -	\$0 (\$405)	 \$3,11	7
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Factors		-			
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)		Discount Factor(4)	Discounted Savings(5)	
A. Elec. B. Dist C. Propane D. Demand E. Other F. Total	\$21.84 \$4.98 \$7.87 \$108.60	16.8 0.0 0.0 2.0 kW	\$367 \$0 \$0 \$220	=	11.70 13.78 14.16 11.70	\$4,29 \$0 \$0 \$2,57	3
3. Non Energ	y Savings (+) or C	ost (-):					
A. Annual Re			\$221	-	11.12	\$2,45	7
B. Non Recu	rring Savings (+) o	r Cost (-)					
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Sav- ings(+)Cost(-)(4)		
a. b. c. d. Total			-	-			
C Total Non i	Energy Discounted	Savings (3A2+3Bd4)			\$2,457		
5. Total Net D 6. Savings to	yback 1G/(2F3+3A Discounted Savings Investment Ratio (nternal Rate of Retu	SIR) 5/1G:)):		3.9 \$9,322 2.99 11.88%	Years	

ECO D4 Sheet of

29 35

		escent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	on Name: D. I150W	/ to 26W/8T4	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
Analysis Date	: March 1993		20011011110 21101		,	
1. Investment	Costs			_		
A. Construction	on Costs		\$5,029	-		
B. SIOH			\$277	•		
C. Design Co	st		\$302			
D. Total Cost	(1A+1B+1C)		\$5,607			
E. Salvage Va	alue of Existing Equ	ıipment			\$0	_
F. Public Utili	ty Company Rebate	9			(\$465)	_
G. Total Inves	stment (1D-1E-1F)					\$5,142
2. Energy Say	vings (+)/Cost(-):					
		for Discount Factors		-		
_		0	Annual \$		Discount	Discounted
Energy	Cost	Saving			Factor(4)	Savings(5)
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Cavings(3)
A. Elec.	\$21.84	24.9	\$543		11.70	\$6,354
B. Dist	\$4.98	0.0	\$0		13.78	\$0
C. Propane	\$7.87	0.0	\$0		14.16	\$0
•		3.5 kW			11.70	\$4,451
D. Demand	\$108.60	3.5 KW	Ψοσο		11.70	ψ1,101
E. Other			\$924			\$10,805
F. Total			Ψ324			\$10,003
3. Non Energ	y Savings (+) or Co	ost (-):		_		
	, , , , , , , , , , , , , , , , , , , ,					
A. Annual Re	curring (+/-)		\$219	-		
(1) Discount f	Factor (Table A)				11.12	
(2) Discounte	d Savings/Cost (3A	(x 3A1)				\$2,438
R Non Recur	ring Savings (+) or	r Cost (-)				
D. NOTT RECUI	inig catings (1) of	0001()				
ltem	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.						
b.			-			
C.						
d. Total						
C Total Non F	Energy Discounted	Savings (3A2+3Bd4)			\$2,438	
O TOTAL MOIT	Lineigy Discounted	outlings (of the 1 ond 1)				
4. Simple Pay	/back 1G/(2F3+3A	+(3Bd1/Economic Life)):		4.5	Years
	Discounted Savings				\$13,243	
	Investment Ratio (S				2.58	
•	nternal Rate of Retu				10.77%	
•		-				

ECO D4
Sheet of 30 35

GANNON

•		ndescent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	tion Name: E. I250 e: March 1993	7VV (0 2-F32/16	Economic Life:	15	YEARS	Preparer: KELLER & G
1. Investmen	t Costs			_		
A. Construct	ion Costs		\$3,900	_		
B. SIOH			\$214	_		
C. Design Co	ost		\$234			
_	t (1A+1B+1C)		\$4,348	=		
	alue of Existing E	guipment			\$0	
_	ity Company Reba				(\$500)	_
	estment (1D-1E-1F					
_						
	avings (+)/Cost(-): TR 85-3273-X Use	d for Discount Factors	10	-		
Energy	Cost	Saving	Annuai \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84	26.8	\$586		11.70	\$6,857
B. Dist	\$4.98	0.0	\$0		13.78	\$0
C. Propane	\$7.87	0.0	\$0		14.16	\$0
D. Demand	\$108.60	3.8 kW	\$411		11.70	\$4,803
E. Other						•
F. Total			\$997	=		\$11,660
3. Non Energ	gy Savings (+) or	Cost (-):		_		
A. Annuai Re	ecurring (+/-)		\$208			
(1) Discount	Factor (Table A)			_	11.12	
(2) Discounte	ed Savings/Cost (3A x 3A1)				\$2,316
B. Non Recu	ırring Savings (+)	or Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	•
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.						
b.			• •			_
c.				_		•
d. Total						•
C Total Non	Energy Discounte	d Savings (3A2+3Bd4)			\$2,316	
4. Simple Pa	yback 1G/(2F3+3	A+(3Bd1/Economic Life)) :		3.2	Yea rs
5. Total Net I	Discounted Saving	gs (2F5+3C):			\$13,976	
	Investment Ratio				3.63	
_	nternal Rate of Re				13.34%	•

ECO D4 Sheet of 3/

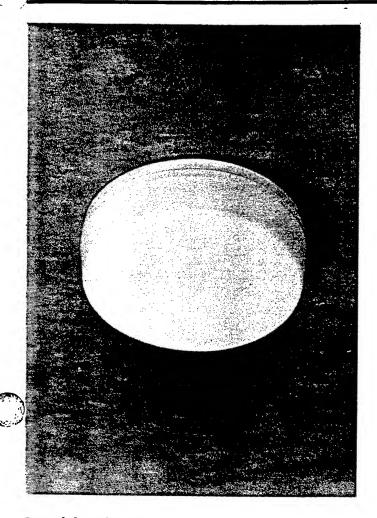
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	Fort Hunter Ligge LIGHTING - Incand on Name: F. 1300V	iescent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	: March 1993		Economic Life:	15	YEARS	Preparer: KELLER & GANNOR
	0-1-					
1. Investment			\$4,485	-		
A. Construction	on Costs		\$247	-		
B. SIOH C. Design Co	a t		\$269	-		
D. Total Cost			\$5,000	-		
	alue of Existing Eq	sinment	40,000		\$0	
_	ty Company Rebat				(\$575)	_
	stment (1D-1E-1F)					\$4,425
	vings (+)/Cost(-):			_		
Date of NISTI	R 85-3273-X Used	for Discount Factors				
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
004.00	Ψ,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	• • • • • • • • • • • • • • • • • • • •		. ,	
A. Elec.	\$21.84	14.1	\$307		11.70	\$3,596
B. Dist	\$4.98	0.0	\$0		13.78	\$0
C. Propane	\$7.87	0.0	\$0		14.16	\$0
D. Demand	\$108.60	5.5 kW	\$597		11.70	\$6,985
E. Other				-		
F. Total			\$904			\$10,581
3. Non Energy	y Savings (+) or C	ost (-):		_		
A. Annual Red	currina (+/-)		\$125			
	actor (Table A)			_	11.12	
	d Savings/Cost (3/	A x 3A1)				\$1,395
B. Non Recur	ring Savings (+) o	r Cost (-)				
la a una	Savings (1)	Year of	Discount		Doscounted Sav-	
Item	Savings(+) Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
	Cos((-)(1)	Occur. (2)	1 40101 (0)		1193(1)0031()(1)	
a.						
b.			~-			
C.				=		
d. Total						
C Total Non E	Energy Discounted	Savings (3A2+3Bd4)			\$1,395	
4. Simple Pay	back 1G/(2F3+3A	+(3Bd1/Economic Life)):		4.3	Years .
	iscounted Savings				\$11,976	
6. Savings to	Investment Ratio (SIR) 5/1G:			2.71	
7. Adjusted In	iternal Rate of Retu	ım (AIRR):			11.14%	

Heavy Duty Unbreakable Vandal Resistant Lens

Energy Saving, Indoor or Outdoor Cut Lighting Cost Up to 80%

RETROFITS A.B AND C



7, 9, 13 or 26 Watt Vandal Resistant Fluorescent Wall or Ceiling

As rugged as it is stylish, this vandal resistant wall or ceiling fixture is the ideal choice for doorway and corridor lighting where style and durability is required.

Housing: Spun steel, painted with electrostatically applied white polyester powder coating.

Diffuser: UV stabilized, injection molded white Acrylic DR.

Ballast: Preheat NPF, 118 volt, engineered specifically for the designated lamp, 7, 9, or 13 watt, 20, 22 watt circline.

Marking: U.L. listed and labeled, damp location standard, use indoor or outdoor.

Annual Energy Savings When Replacing Incandescent

Fluorescent	Equivalent	Dollar Savings per KWH						
Lamp	Incandescent	6¢	8¢	10¢				
7 watt	40 watt	16.29	21.72	27.16				
9 watt	60 watt	25.75	39.94	49.92				
13 watt	75 watt	31.01	41.35	51.68				

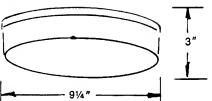
Note: Based on burning 24 hours per day. Equivalent incandescent wattages are approximates, and are based on replacing standard A-Line incandescent lamps. Wattage comparison may vary with application.

Footcandle Measurements

Based on single wall mounted fixture • 6' wide corridor 8' ceiling height • 6' mounting height • 80% ceiling reflectance 50% wall reflectance • 20% floor reflectance.

Catalog	Dista	Distance from fixture along the wall								
number	0′	2′	4′	6′	8′	10′	12′	14'	16′	

Specifications



Ordering Information/Operating Characteristics

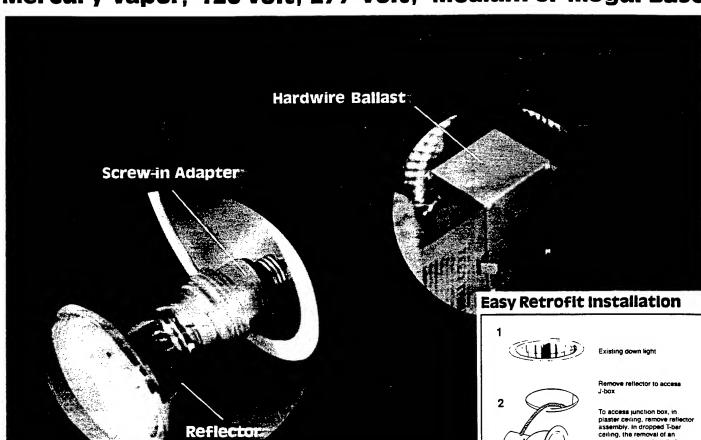
Catalog number	Lamp Type	Initial Lumens	Approximate Incandescent Equivalent	Lamp* Life hours	Input Volts	Input Watts	Input Amps Starting	Input Amps Operating	Minimum starting Temp.
1401-7	PL-7	400	40	10,000	118	9	.240	.180	0°F
1401-9 1401-13 1401-2X13	PL-9 PL-13 PL-13	600 900 1800	60 75 100	10,000 10,000 10,000	118 118 18	11 15 30	.240 .350 .700	.180 .250 .500	25°F 32°F 32°F

Based on 3 hr burn-longer burning cycle will result in proportionally longer life.



The Ultimate Fluorescent Retrofit! From Janmar

Convert Virtually Any Recessed Fixture, Incandescent, Mercury Vapor, 120 Volt, 277 Volt, Medium or Mogul Base



Patent Pending

You Make The Choice!

At last you can select the length, the wattage and reflector to exactly fit your lighting requirements.

Convert those, energy robbing, Incandescent or Mercury Vapor recessed fixtures to energy efficient Flourescent, quickly and easily. No need to remove existing socket. Simply wire in ballast assembly to the top of junction box, and screw in adapter-reflector assembly.

Check These Options!

Ballast • 120 Volt, 277 Volt

High Power Factor

Class P (Thermal Protection)

Lamps • 5, 7, 9 or 13 Watt Twin Tube

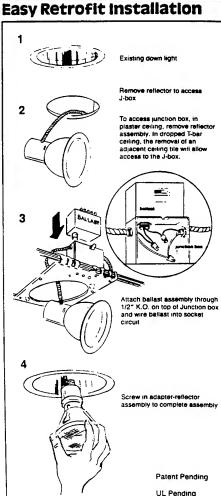
•13 Watt Quad Double Twin Tube

28 Watt Quad Double Twin Tube

Length • 3 Optional Adapter Lengths for

Various Depth Fixtures.

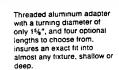
Base • Medium Edison Standard
Mogul Base Optional

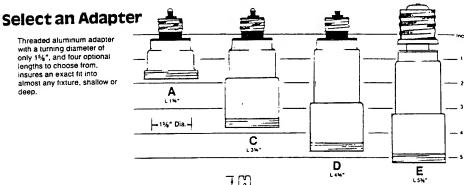


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213 Series The Ultimate Fluorescent Retrofit!



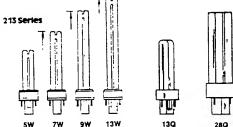




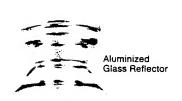
PL Lamp



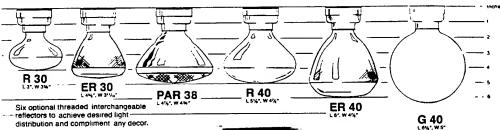
Nine optional lamp wattages insures desired level of illumination.



Mogul Base optional on all units, use order suffix MR. add %" to overall length.



Select a Reflector

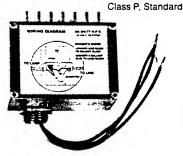




Reflector available on all 213 Series



Ordering Information / Operating Characteristics 213 Series



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Aluminum Ballast

Housing Type 1 Potted Ballast

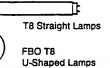
Options:

277 Volt (120 Volt Standard) High Power Factor HP

MB Mogul Base REF Reflector

Edison Socket Extender MBE Mogul Base Socket Extender

Model No. & Option Suffix	Flourescent Lamps Watts and Initial Lumens	incandescent replacement	Optional reflectors		onal Scr lled Ler		ocket	Maximun Foot-Can at 8'
	Single Twin Lamps			Α	С	D	Ε	
213-5A-R30 213-5A-ER30 213-5A-R40 213-5A-PAR 38 213-5A-G40	5 Watt Twin Tube 250 Lumens :	25 to 40 Watts 200 to 350 Lumens	R 30 ER 30 R 40 PAR 38 G 40	4¾" 5¾" 6½" 6¼" 7¾"	5¾" 6¾" 7½" 7¼" 8¾"	6¾" 7¾" 8½" 8¼" 9¾"	74" 84" 9½" 9¼" 10¾"	2.3 2.3 3.9 4.3 8
213-7A-ER30 213-7A-R40 213-7A-PAR 38 213-7A-G40	7 Watt Twin Tube 400 Lumens	40 to 75 Watts 350 to 765 Lumens	ER 30 R 40 PAR 38 G 40	5¾" 6½" 6¼" 7¾"	6¾" 7½" 7¼" 8¾"	7¾" 8½" 8¼" 9¾"	8¼" 9½" 9¼" 10¾"	2.5 2.3 4.0 1.1
213-9A-ER40 213-9A-G40	9 Watt Twin Tube 600 Lumens	50 to 100 Watts 425 to 1200 Lumens	ER 40 G 40	7½" 7¾"	8½" 8¾"	91/2"	10½″ 10¾″	4.3 1.7
	10mm Quad Double	Twin Lamps		Α	С	D	Ε	
213-13Q-A-ER30 213-13Q-A-R40 213-13Q-A-PAR 38 213-13Q-A-G40	13 Watt Quad Double Twin Tube 900 Lumens	75 to 150 Watts 765 to 1740 Lumens	ER 30 R 40 PAR 38 G 40	5¾" 6½" 6¼" 7¾"	6¾" 7½" 7¼" 8¾"	7¾* 8½* 8¼* 9¾*	8¾" 9½" 9¼" 10¾"	3.3 6.9 7.2 1.6
	15mm Quad Double	Twin Lamps		Α	С	D	E	
213-28Q-A	28 Watt Quad Double Twin Tube 1600 Lumens	150 to 200 Watts 1740 to 2000 Lumens	FI 60	9	10	11	12	12.4





			<u> </u>	711	E. E. 1	300	F-3	5
Lamp:Datas	Min*		Electrical Data			Wirings	Shipp	ing Data
Description Watts	Starting: Catalog Numbers: Temp: (All Class:P)†*	Notes	Line Input: Current ANSI (Amps) (Watts)		(Page:24)		Weight: Std. Ctn: (Lbs.)≥	
One Lamp—High Pow	er Factor							

One Lam	p—High	Power	Factor
---------	--------	--------------	---------------

(1) FBO16T8, (1) F17T8.	16 17	120	50	R-1P817-TP		.195	23	444		3.E. 3.74		
(1) FO17T8	17	277	50	V-1P817-TP		.085	23		西北江	20	10	38
(1) FBO24T8, (1) F25T8.	24 25	120	50	R-1P825-TP	2	.30	33			-		
(1) FO25T8	25	277	50	V-1P825-TP		.12	33	1333	第二次	20.	10	38
(1) FBO31T8, (1) F32T8.	31 32	120	50 50 50 50	R-1P32-TP REL-3P32-TP (Electronic) RIC-140-TP (Electronic IC) RIC-132-TP (Electronic IC)	1,2 50 2,5 5	.32 .34 .35 .27	37 37 40 31			20 93 20 20	10	37 26 15 15
(1) FO32T8	32	277	50 50 50 50	V-1P32-TP VEL-3P32-TP (Electronic) VIC-140-TP (Electronic IC) VIC-132-TP (Electronic IC)	1,2 50 5 5	.14 .15 .15	37 37 40 31			93 20 20 20	10	37 26 15 15
(1) F40T8,	40	120	50	R-1P840-TP	2	.44	50	Adlia	F2E n	202	10	38
(1) FO40T8	1 +0	277	50	V-1P840-TP		.19	50	7.25	WATER	20	10	38

Two Lamps—High Power Factor

Two Lamps	—Hiç	h Po	wer F	actor				/ RETADIST E A.	OF	
(2) FBO16T8, (2) F17T8,	16 17	120	50	R-2P817-TP		.39	45	Assistance - Page	10	38
(2) FO17T8	17	277	50	V-2P817-TP		.163	45	A 128 2 21	10	38
(2) FBO24T8, (2) F25T8,	24 25	120	50	R-2P825-TP	2	.55	65	A 7 120 1 00215 1	10	38
(2) FO25T8	25	277	50	V-2P825-TP		.24	65	1 Au 3 12 1 4 5 12 1	10	38
(2) FBO31T8, (2) F32T8.	31 32	120	50 50 50 50	R-2P32-TP REL-3P32-TP (Electronic) RIC-2S40-TP (Electronic IC) RIC-2S32-TP (Electronic IC)	1,2 2,40,50 2,5,49 5,49	.61 .57 .65	71 6 4 77 61	215 337 215 215 216	10	37 26 15 15
(2) FO32T8	32	277	50 50 50 50	V-2P32-TP VEL-3P32-TP (Electronic) VIC-2S40-TP (Electronic IC) VIC-2S32-TP (Electronic IC)	1,2 2,40,50 2,5,49 5,49	.26 .24 .27 .22	71 63 73 60	278 10822 2012 2012 2013 2013	10	37 26 15 15
(2) F40T8,	40	120	50	R-2P840-TP	2	.77	92	A PROPERTY OF THE PERSON NAMED IN COLUMN	10	38
(2) FO40T8		277	50	V-2P840-TP		.34	92	A 128 - 21'0	10	38

Three Lamps—High Power Factor

(3) FBO16T8, (3) F17T8,	16 17	120	50	REL-3P32-TP (Electronic) REL-4P32-TP (Electronic)	50 50	.45 .46	51 53	As 93 97		26 25
(3) FO17T8	17	277	50	VEL-3P32-TP (Electronic) VEL-4P32-TP (Electronic)	50 50	.18 .20	46 51	93 97	10	26 25
(3) FBO24T8, (3) F25T8.	24 25	120	50	REL-3P32-TP (Electronic) RIC-3S32-TP (Electronic IC)	50 5	.61 .58	70 68			26 25
(3) FO25T8	25	277	50	VEL-3P32-TP (Electronic) VIC-3S32-TP (Electronic IC)	5 0 5	.25 .25	65 66		10	26 25
(3) FBO31T8, (3) F32T8.	31 32	120	50	REL-3P32-TP (Electronic) REL-4P32-TP (Electronic) RIC-3S32-TP (Electronic IC)	50 50 5	.77 .80 .82	89 93 95	A 9 12 97 //	10	26 25 25
(3) FO32T8	32	277	50	VEL-3P32-TP (Electronic) VEL-4P32-TP (Electronic) VIC-3S32-TP (Electronic IC)	50 50 5	.31 .34 .34	83 91 93	A F2 93 97 93	10	26 25 25
(3) F40T8, (3) FO40T8	40	120 277	50 50	REL-3P32-TP (Electronic) VEL-3P32-TP (Electronic)	40,50 40.50	.93 .38	108 100	A= F2 93	10	25

Four Lamps—High Power Factor

		J ~		40.01				
(4) FBO16T8 (4) F17T8	16	120	50	REL-4P32-TP (Electronic)	50	.57	66	A 97 10 25
(4) FO17T8	17	277	50	VEL-4P32-TP (Electronic)	50	.23	61	A 97 10 25
(4) FBO24T8 (4) F25T8	24 25	120	50	REL-4P32-TP (Electronic)	50	.77	89	A 97 10 25
(4) FO25T8	25	277	50	VEL-4P32-TP (Electronic)	50	.32	85	A 97 10 25
(4) F32T8, (4) F032T8,	32	120	50	REL-4P32-TP (Electronic)	50	.97	112	A 97 10 25
(4) FBO31T8	32	277	50	VEL-4P32-TP (Electronic)	50	.41	110	A 7 7-2 97 10 25

NOTES: 1. CBM Approved. 2. CSA Approved. 5. Mark V Integrated Circuit electronic ballast. 40. Will also operate FO17. FO25 and FO40T8 rapid start lamps. 49. Remote Mounting—One or two lamp remote mounting. For single lamp remote mounting, only "red lead" lamp can be mounted remote from fixture. Maximum remote mounting. 20 ft. lead length. 50. Parallel Connect ballast. Will instant start rapid start lamps. rapid start lamps.

†Ordering Information: Units shown are furnished with Class P ADVAN-guard® Automatic Resetting Thermostat. Units packed in Individual Cartons—Add suffix—I.

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	INSTALL ELECTRONIC	PROJECT1G-403-10
CHECKED BY	BALLAST & T8 LAMPS	
DATE	Eco# D5	SHEET NOOF SHEETS
	-	
	£	
- DESCRIPTION OF	ACTION	
THIS RETROFT	T WINLD REPLACE EXISTING	FLANTERCENT BALLASTS
	PLGT SAVING CORE + COIL BALLAST	_
	BALLASTS AND F32/T8 LAW	<i>J</i>
	DEMAND SAVINGS WILL RESU	
	-	
- SCREENING ANAL	ises	
(2)	TO IN DESTRUCT	A D YC1C
(1) L-LAMP KALL	AST \$ T8 LAMP RETROFIT - 1	V MI (MAUC 12/2
SAVINGS:	72W(EXIST) - 61 W(NEW) = 11	W × 2860 Hrs = 315 kmH/
	2 2 7 / V .007	1000 W/hW 10014
LCC STIVINGS	= 31.5 KWH/mx 30.07454/k	
	·011 hw × 7108.60/	KM X 11.12 NAMA
	= 740.75	
The second secon		
COSTS: MA	TERIAL - 132 x 1.08 = 34.56	
	ABOR - 31.60	
A SAME AND A SAME AND		1.30 × 1.01 × 1.10 × 1.11 =
	AL COST \$106	
P	LIE REBATE (12)	
TOTA	L INVESTMENT \$ 94	
3		
SIR = 741	2.75/394	
	1.2	
= 0.5		
	LAST 4 T8 LAMP RETICOFIT - V	1. W. W. 18
		·
SAIVINGS	115W(EXIST) - 91W (NEW) = 24	W x 28601715 = 68.6 KWH/YR
177 CANISA	= 68.6 k-H/40_x 0.07454/km	X 11.70 40 10 +
Ter Suggest		
	8 -024 hw x + tox.60	
		THAN THE 2-LAMP BALLAST
	INESTMENT C	ost.

FORM 101-1/8

Engineers-Architects

COMPUTED BY RCL	IMPROVE POWER FACTOR	PROJECT_16-403-10
CHECKED BY	ECO # D8	
REV		SHEET NO. 1 OF 13 SHEETS
		• • •
DESCRIPTUM OF AC	Tion	
APPLICA- 3 TO S	POWER FACTOR CORNECTION CI	APACITORS IS CONSIDERED
- FAR TWO GENERA	[CONDITIONS: (1) INSTALLAT	AT THE
MAIN UTILITY	METERING POINT AND (2) INST	MUATION AT EACH IMPUNDARY
AFFENDING MOTOR.	LOCATION AT THE MAIN SE	RUKE POINT WILL
REDALE Blumby Per	NALTIES ONLY AND NOT IMPROVE	LUAD CAPABILITIES
OF THE DISTRIBUTION	N SYSTEM. INSTALLATION	AT INDIVIONAL MOTORS
WILL FREE UP SYST	EM CAPACITY BY REDUCING TO	A MONN TOP
MAGNETIZING WAR	ENT DRAWN KROW THE NTILL	77 SAPPLY.
(1) INSTALLATION	e pate metering point - s	AVINGS CALLILATIONS
DATA & ASSUMPTIONS	: ;	
A. PE4E RME	SCHEDULE A-20 INCLUDES A	0.06% ADJUSTMENT
ON THE TOTA	- RILLING FOR EACH 1% POWER	FACTOR DIFFERENCE
Friom 85%		
L AJERASS MA	and Post Billings! Goo, 000 Dun	ing Summer PERIOD:
	DURING WINTER PERIOD	
· ·		
C. AVERAGE P	_	-
	mar Pkriot - 82/83%	
Miny	er Period - 85/86%	AL 11 ALL 1
1. Summar PE	AK DEMAND - 3,160 kW	
(A. 112) A. 2 . 3		- shows an quadra a
CALCULATIONS:	امرين سيد د ا	02~
a. PEAK KUAR	(EXISTING) = - TAN (LOK-1	
	= 3,160 KWX TAN (34,1	41")
	= 2,165 KVAR	
b. PEAL LIAZ.	(WARECTED TO 95%)	·

= 3,160 KW x TAN (Cos-1.95)

3,160 KW x TAN (18.19°)

1,039 KUAR

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY Ra	IMPROJE POWER FACTOR	PROJECT 15 403-10
CHECKED BY	Eco #D8	SHEET NO. 7- OF 13 St
REV		SHEET NOOFS

* ASSUMING CORRECTION TO AN AVERAGE P.F. OF 95%

Keller & Gannon

Engineers-Architects

NEW LOSS

12R(w)

10

23

SAVINGS

WATTS

21

36

RESISTANCE

אנטטט\

1.620

1.620

LOSS

ILR (m)

17

35

COMPUTED BY RU	IMPRILE POWER FACTOR	PROJECT_16-403-16
DATE FEBRUARY 1993 REV. 1913	E COT D8	SHEET NO. 3 OF 13 SHEETS

(2) INSTALLATION OF P.K. CARRECTON CAPACITORS & MOTOR LOADS

ANNUAL KWH SAVINGS DNE TO A REDUCTION IN MOTOR CIRCUIT I'R LUSSES ARE ESTIMATED AS FOLLOWS (SEE NOTES):

REDUCTION %

22

20

MAX KUAR

2.5

3

HP RATING

5

7.5

FLAR

460 v

7.6

11

• •							
10	4	18	14	1.620	57	38	57
15	5	18	21	1.018	81	54	78 .
20	6	17	27	0.640	84	58	78
25	7.5	17	34	0.640	133	92	123
30	&	16	40	0.410	118	83_	102
40	15	16	52	0.410	200	141-	מרו
50	17.5	15	65	0.259	197	142	165
60	20	15	77	0.164	175	126	147
75	25	14	96	0.129	214	158	168
HPRATING	MAX KVAR	CURRENT, REDUCTION %	FLAC 2000	RESISTANCE JZ/1000'	IZR LKS EXIST.	IN WATTS NEW	SAVINGS
2	!	24	7.8	1.620	18	10	24
3	1.5	23	11	1.620	35	21	42
5	2.5	22	17.5	1.620	ક્ષ્વ	54	105
7.5	3	20	25	1.018	115	73	126
10	4	18	32	0.640.	118	79	117
15	5	18	53	0.410	207	140	201
20	Ġ	17	68	0.259	215	149	201
25	7.5	17	85	0.259	337	232	315
33	3	6 !	100	0.102	232	206	258
to	15	16	130	0-129	312	277	345
≼ s	17.5	15	163	0.081	387	280	321
63	23	15	193	0.064	-29	310	357
75	25	14	240	0.043	446	330	348

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	IMPROVE POWER FACTOR	PROJECT_ 16-403-10
CHECKED BY	F 60 # 78	
DATE 19 13 REV. 1993		SHEET NO. 4 OF 13 SHEETS

ASSUMPTIONS:

- 1. KVAR VALUES BASED ON RAISING FULL LOAD POWER FACTOR TO APPROX 95%.
- 2. MOTORS ASSUMED TO BE NEMA DESIGN B, T-FRAME, 1800 RPM
- 3. RESISTANCE OF MOTOR LIRCUIT ASSUMES COMPUCTOR SIZED AT 125% OF YALL LOAD AMPS AND A LENGTH OF 180 FEET.
- 4. INSTIR CIRCUIT SAVINGS IN WATTS = (EXST LER NEW IZR) X 3

SCREENING ANALYSS - 460V MOTORS

	70	1632 MING III	711215 3 100		11	
HP RATING	KVARZ	KW SAUMGS	LABOR UST	MAT'L COST	TOTAL INVESTIL	BREAKEVEN OP HONRS
5	2.5	0.021	95	270	588.	24,490
7.5	3	0.036	95	280	604	14,130
10	4	0.057	95	300	636	8,940
15	5	0.078	130	320	708	7,02
20	6	5.078	120	340	740	7,400
25	7.5	0.123	120	355	765	4,380
30	8	0.102	120	370	789	5,780
ito_	15	0.177	120	485	974	3,720
çs	175	3.15	175	515	1,062	4,580
Ğo	20	0.177	145	540	1,103	5,565
75	25	0.168	145	الان الان	1,208	5,230

1 INVESTMENT = (LABORT 1.08x MATIL) x 1.90x 1.01 x 1.10 x 1.115

21 BREAKEVED OF HONRS / YEAR = TOTAL INVESTMENT - RW SAVINGS X 108.60/2 WX 13.5 KW SAUMAS X & 0.07454/kWH x 14.53

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	IMPROVE POWER FACTOR	PROJECT
CHECKED BY		
DATE FEBRAARY 1943		
REV		SHEET NO. 5 OF 13 SHEETS

SCREENING ANALYSIS - 2004 MOTORS

HP RATING	KUAR	KW SAVINGS	LABOR LOST	MATIL COST	TOTAL INUST. !! W/SIOHOUSSON	BREAKEVEN? OP HOURS/YR
2	1	0.024	85	240	523	18,760
3	1.5	0.042	85	275	580	11,390
5	2.5	0.105	115	345	740	5,145
7.5	3	0.126	115	360	7.65	4,24
10	4	0.117	138	380	820	4,675
15	5	0.201	130	400	853	2,555
20	6	0.201	130	420	885	2,700
25	7.5	0.315	150	465	9 90	1,540
30	8	0.258	150	500	1,046	2,380
40	15	0.345	180	765	1,521	2,710
50	17.5	0.321	200	860	1,706	3,545
60	20	0.357	215	920	1,827	3,520
75	25	0.348	235	1,100	2,149	4,340

1 INVESTMENT = (LABOR + 1.08x MATY) x 1.30 x 1.01 x 1.10 x 1.115

21 BREAKEVEN OP HOWRS / YEAR = TOTAL INVISTMENT - KW SAVINGS X 108.60/EW X 13.5° KW SAVINGS X * 0.07454 X 14.53

LIFE CYCLE COST ANALYSES FOR MOTOR ENSTAURTING MEETING
THE MINIMUM BREAKENEN HOMES/ YE ARE DEVELOPED IN THE
JEALLOWING SPREADSHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY REL	IMPROVE POWER FACTOR	PROJECT FT. HUNTER LIGGETT
CHECKED BY	•	
DATE		SHEET NO 6 OF 13 SHEETS
REV 19		SHEET NO. OF 15 SHEETS

CAPACITURS INSTALLED AT MOTOR LUAD

BUILDING	Supp	_~	RET	iney	TOTAL KW.	usage	Kwit
Parcolnol	·-HP·	KW SAVINGS	HP	KMSAVINGS	s avags	HRSITR	SAUINGS
205	25	0.315	10	0.117	6.432	5,840	2,523
_256	201011	1.0.114	1		-0-1-4	7,300	832
207	25	0.315	10	10.117	0.432	5840	2,513
208	25	0.315	1.5	6.117	0.432	2,8 40	2,523
210	10	0.117	-	_	6.117	8,760	1,025
229	25	0.315	10	0.117	0.432	5,840	2,523
230	25	0.315	10	0.117	0.432	5,840	2,523
			-				-
					2.277		13 640

11-460V MOTORS; ALL OTHERS ARE 200V MOTORS

ANNAL DEMAND SAVINGS = 27277 KW × 108.60/1W = 247

ANNUAL MBTU SAVINGS = 13,640 KWH X ,003413 MRTW/ KWH

= 46.6

REV 6/43

CONSTRUCTION COST E	STIMAT	Έ		DATE PREPARED FEBRUARY	1993		7 of 13
PROJECT						R ESTIMATE	
EEAP LIMITED ENERLY	STUD	~		Pruz. NG. D8	-	CODE A (No deal	
LOCATION FURT HUNTER LIGHET	T. LAI	JIS R	AIL		_	DE B (Preliminar) CODE C (Final d	
ARCHITECT ENGINEER	· · · · · · · · · · · · · · · · · · ·					HER (Specify)	
KELLER & GANNON DRAWING NO.		ESTIM	ATOR		<u> </u>	CHECKED BY	SIH
		<u> </u>		RCL			>1 F1
POWER FACTOR CORRECTION	QUANT NO.	UNIT	PER	LABOR	PER	ATERIAL	TOTAL
AT PGTE METERING POINT	UNITS	MEAS.	UNIT	TOTAL	UNIT	TOTAL	
1200 KUAR, 12KV							
PADMOUNTED CAPACITOR							
BANK INCLUDING INCOMING						- <u>-</u>	
LINE SECTION AND CAPACITUR							
Switching	_	LS	-	4,000		23,000	27,000
CONCRETE PAD & SITE							
WORK	_	LS	-	800	-	200	1,000
FEEDER TO PG48							
METERING LOCATION	30	LF	25	750	20	600	1,350
·							
QUOTATION FROM LIGE							
ELECTRICAL SALES, INC.							
FIR ABB BROWN BUIER							
EUNIPMENT DATED 2/8/93							
· SUBTOTAL				5,550	-	23.800	
GEN CONDITIONSE 8%			-	-	-	-	2,348
SURTOTAL			-	-	_	-	31,698
CONTRACTOR OH & PROBIT 6307	0		-	-	_	-	2,348 31,698 9,509
SUBTOTAL			-		_		41,207
BOND @ 19.			-	-	_		412
SUBTOTAL			-	-	_		41,619
ESTIMATING LONT, JGENNY QID),		-		-	_	4,167
TOTAL CONSTRUCTION COST			-	-			45,781
10 110 0010 11010 0001							

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARED	INNE 1	993 SHEET	8 of 13
PROJECT	ہے۔ پ	بمّع	Po	65 D8		R ESTIMATE	
EEAP LIMITED ENERG	1, 21	וכייי		<u>a, D8</u>		CODE A (No design	
FORT HUNTER LIGHETT,	LA.					CODE C (Final design	-
ARCHITECT ENGINEER KELLERY GANNON					o1	HER (Specify)	
DRAWING NO.		ESTIM	ATOR	Ru		CHECKED BY BIT	}
	QUANT	ITY		LABOR		MATERIAL	
P.F. CORNELTION SUMMARY	NO.	UNIT	PER	TOTAL	PER	TOTAL	TOTAL COST
@ INDIVIDUAL MOTORS	UNITS	MEAS.	UNIT		UNIT		
1. Y KVAR CAPACITUR	5	EA	130	650	380	1,900	2,550
Z. 7.5 KUAR LAPAZITOR	6	ÉA	150	900	465	2,790	3,690
		-					
					_		
				•			
		-		ļ			
		1					
C		1		1,550		4695	6,240
SURTOTAL.		-		, , , ,			499
GENERAL CONDITIONS & 8%							6,739
SUBTOTAL							
CONTRACTOR OH 4 PROFITE 30%			· <u>-</u>				2,022
SUBTLIAL		ļ					3,761
BOMD & 1%		ļ					38
SURTITAL							8.849
ESTIMATING CONTINGENT COST							885
TOTAL PROBABLE							
CANSTRUCTION COST							9,733

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGGETT, LA PROJECT TITLE: IMPROVE POWER FACTOR DISCRETE PORTION NAME: POWER FACTOR CORRECTS	REGION NO. 4 PROJECT NO. D8
DISCRETE PORTION NAME: POWER FACTOR CORRECTOR	IN AT DEANOE METERING POINT
ANALYSIS DATE: JANE'93 ECONOMIC LIFE 20	PREPARER ICELLUIC &GANNON
1. INVESTMENT COSTS: A. CONSTRUCTION COST \$ 45,781	
C. DESIGN COST \$ 2,747	
D. TOTAL COST (1A+1B+1C) \$ \$1,046	,
E. SALVAGE VALUE OF EXISTING EQUIPMENT \$	<u>Ф</u>
F. PUBLIC UTILITY COMPANY REBATE \$ G. TOTAL INVESTMENT (1D-1E-1F)	s 51,646
G. TOTAL INVESTMENT (1D-1E-1F)	\$ 31,040
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACT	ORS 10/42
ENERGY COST SAVING ANNUAL \$ DISC SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACT	OR(4) SAVINGS(5)
A. ELEC \$ \$	\$
A. ELEC \$ DIST \$	\$
C. RESID S S	
F PPC S	
F. COAL S	<u> </u>
G. SOLAR \$ \$	\$
H. GEOTH \$ \$	\$
I. BIOMA \$\$	\$
J. REFUS \$\$	\$
K. WIND S	
M. DEMAND SAVINGS \$	<u>*</u>
N. TOTAL \$	\$
3. NON ENERGY SAVINGS (+) OR COST (-):	
A. ANNUAL RECURRING (+/-) \$ 6,480	
(1) DISCOUNT FACTOR (TABLE A) 13. (2) DISCOUNTED SAVINGS/COST (3A X 3A1)	\$ 88,063
(.,,	
B. NON RECURRING SAVINGS (+) OR COST (-)	-
ITEM SAVINGS(+) YEAR OF DISCOU • COST(-)(1) OCCUR. (2) FACTOR	INT DISCOUNTED SAV- R(3) INGS(+)COST(-)(4)
a\$	\$
b. \$	\$
	\$
d. TOTAL \$C. TOTAL NON ENERGY DISCOUNTED SAVINGS (3A2+3Bd	\$ <u>88.063</u>
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMIC LI	FE)): 7.88 YEARS
5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C):	\$ 88,063
6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G:	1.73 6.89 z
7. ADJUSTED INTERNAL RATE OF RETURN (AIRR):	4.01

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGGETT CA. REGION NO. 4 PROJECT NO. D8 PROJECT TITLE: IMPROVE POWER FACTOR FISCAL YEAR DISCRETE PORTION NAME: POWER FACTOR WARRECTION AT INDIVIOUS MOTORS
ANALYSIS DATE: June 03 ECONOMIC LIFE ZO PREPARER KELLER & GANNON
1. INVESTMENT COSTS: A. CONSTRUCTION COST \$ 9 733 B. SIOH \$ 535 C. DESIGN COST \$ 594 D. TOTAL COST (1A+1B+1C) \$ 10, E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ \$ 5 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS 10/92
ENERGY COST SAVING ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
A. ELEC \$ 21.84
J. REFUS \$ \$ \$ K. WIND \$ \$ \$ L. OTHER \$ \$ \$ M. DEMAND SAVINGS \$ 247 14.53 \$ 3.543 N. TOTAL \$ 1,265 \$ 18,381
3. NON ENERGY SAVINGS (+) OR COST (-):
A. ANNUAL RECURRING (+/-) \$
B. NON RECURRING SAVINGS (+) OR COST (-)
ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV COST(-)(1) OCCUR. (2) FACTOR(3) INGS(+)COST(-)(4)
a. \$ \$ b. \$ \$ c. \$ \$ d. TOTAL \$ \$ C. TOTAL NON ENERGY DISCOUNTED SAVINGS (3A2+3Bd4) \$ 3
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMIC LIFE)): 5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 7. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 6. OF RETURN (AIRR): 6. OF RETURN (AIRR):

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGHETT TA	region no. + project no. D8
PROJECT TITLE: IMPROVE POWER FACTOR	FISCAL YEAR_
DISCRETE PORTION NAME: TOTAL PROTECT ANALYSIS DATE: JUNE 93 ECONOMIC LIFE	
ANALYSIS DATE: June 43 ECONOMIC LIFE	LO PREPARER KELLER TAANNON
1. INVESTMENT COSTS: A. CONSTRUCTION COST B. SIOH C. DESIGN COST D. TOTAL COST (1A+1B+1C) \$ 61,973 E. SALVAGE VALUE OF EXISTING EQUIPMENT F. PUBLIC UTILITY COMPANY REBATE G. TOTAL INVESTMENT (1D-1E-1F)	\$\$ \$ \$_61,973_
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT	
ENERGY COST SAVING ANNUAL \$ SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3)	
A. ELEC \$ 21.84 46.6 \$ 1.018 DIST \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	14.53 \$ 14,792 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
(2) DISCOUNTED SAVINGS/COST (3A X 3A1)	\$ 88,063
B. NON RECURRING SAVINGS (+) OR COST (-)	
ITEM SAVINGS(+) YEAR OF D - COST(-)(1) OCCUR. (2) F	ACTOR(3) INGS(+)COST(-)(4)
a. \$ b. \$ c. \$ d. TOTAL \$ C. TOTAL NON ENERGY DISCOUNTED SAVINGS (3A	\$
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMI 5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 7. ADJUSTED INTERNAL RATE OF RETURN (AIRR)	8.60 YEARS \$ 106,444 1.72



PAD MOUNTED CAPACITOR ASSEMBLIES

Metal Enclosed Capacitor Assemblies Pad Mounted 5 and 15kV Class

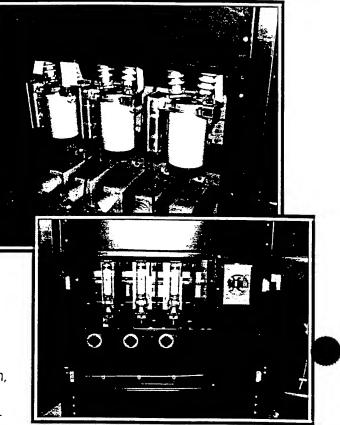
Pad Mounted Capacitor Assemblies to meet maximum kVAR requirements, while maintaining aesthetic concerns, are available from ABB. These low profile, economical units are provided for both 5kV and 15kV class applications. Pad Mounted Capacitor Assemblies will help to correct poor power factor and reduce demand on substation transformers.

General Features

Rugged 11-gauge steel, finished with two coats of baked enamel, make the enclosures sturdy, weather resistant and attractive. Available in a bolted or welded construction, these units offer front and rear door access, (dead-front) barriers, and a 3-point latching system, with means for padlocking, to insure security. Other standard enclosure features include non-corrosive hardware, ventilation, lifting provisions and a domed roof.

Typically, these assemblies are (60"H x 60"W x 60"D) and will meet a wide range of capacitor application needs. Capacitors can be standard or inverted mount to allow for oil or vacuum switching arrangements, bushings, continuous ground bus, and individual or group fusing.

Various options are available such as key interlocks, control power transformer, pentahead bolts, and custom controls. All Pad Mounted Capacitor Assemblies are designed and built in accordance with applicable ANSI, NEMA, and IEEE standards.



- Compact Design
- Economical
- Rugged Construction
- Tamper Resistant
- Available Through 2400 kVAR





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(CAEC)	211 -	
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Receiving Location: Kellor & Ganny
Facsimile Number:
Attention: Dick LENNICK
From: Day Condon
The land
Subject: ABB FAD Mounted CADACITED FOONES
Dassed on our prevous phone conversations a hidget price for a 1200 kvar article Pad mounded CAP. Flank would be \$23,000.
a hidget paice for a 1200 KVA2 attack
Pas mounded CAP. Frank would be \$23,000.
This includes an incoming line Section and under a corpacitor Section with corpacitor Suitching.
a espacitor section with espacitor suitching
Approx. dimensions are 90" HX 120" NX 60" Deep WISTH MAY be decreased depending on incoming Line requirements
WISTH MAY be decreased depending on incoming
Line repairements
6
I Am Linding you discise of the literature under
a seperate lang. Son this took to long.
Please coell of you have my guestine.
Doug Contin

1330 S. Bascom Ave., Ste. F · San Jose, CA 95128 · (408) 293-0755 · Fax (408) 293-0419

Keller & Gannon

Engineers-Architects

COMPUTED BY Re-	REPLACE MOTORS WITH	PROJECT 16-403-10
CHECKED BY	HIGH EFFICIENCY UNITS	
REV	ECO # D9	SHEET NO. 1 OF 2 SHEETS

DESCRIPTION OF ACTION

SCREENING ANALYSIS

THIS PRUTECT WOULD REPLACE EXISTING STANDARD - EKALLIKET MUTTIRS WITH PREMIUM EXFELIENCY WHITS TO GENERATE BUTH - IKWH AND KW DEMAND SAVINGS.

HOURS/YR OPER, REG'D FOR REPLACEMENT TO BE JUSTIFIED:

		8/ ·		AL	.L OVE		0 Hr/41	~
Mominal	FOO ET	PREMIUM 1	LABOR	MATIL CUST 2	TOTAL CUST 31	PG+E REBATE	TOTAL INVEST, 4	Breakenen of Hurs/Year
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2	79	84	80	275	607	40	567	
3	81	87.5	80	320	685	40	645	4 · 4 · 4 · 4 · 4 · 4 · 4 · 4 · 4 · 4 ·
\$	82	87.5	80	. 385.	798	_50	748	54,330
7.5	84	895	85	480	971	60	911	
10	85.	89.5	90	590	1,171	70	1,101	
15	86	910	110	825	1,162	85	1,077	
20	87	91.0	135	1,000	1,956	100	1,856	50,780
25	88	92.4	140	1305	2,705	120	2,585	
30	89	92.4	150	1,550	2,937	04)	2,797	
40	89	93.0	175	2,030	3,812	160	3,652	
50	89	930	220	2,285	4,327	180	4.147	47,540
63	89	93.6	250	3,545	6,567	180	6,387	
75	90	94.1	295	4,145	7.682	200	7,482	7 · · · · · · · · · · · · · · · · · · ·
100	90	945	. 380	5,830	10,749	250	10,449	
125	90	94.5	495	6,850	12,708	350	12,358	
150	91	95.0	580	8,025	14,888	450	14,438	58,000

¹¹ NEMA NOMINAL EFFICIENCY FOR 1800 ROM, TEFC MOTOR

^{21 75%} X LIST PRILE FOR BALDOR SWPER-E

³¹ TOTAL LOST = (LABOR LOST + 1.08 x MATILLOST) X 1.30 x 1.01 x 1.10 x 1.115

I TOTAL INVISTMENT = TOTAL COST - PG+= REBAT

SI BREAKEVEN - THAN INVEST - (HPX.746x PCTG LOAD X 108.60/kW) X (100 - 100 PREMEFF OP HONGE/YR

HPX.746x PCTG LOAD X 2.06223/km X (100 - 100 PREMEFF PREMEFF)

WHERE PCTG, LOAD = .75

Keller & Gannon

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COMPUTED BY RUL	REPLACE MOTORS WITH	PROJECT 16-403-10
CHECKED BY	HIGH EFFICIENCY MNITS	
DATE FERMARY 19-12 REV 19	ECO# D9	SHEET NO. 2 OF 2 SHEETS

THUS, REPLACING EXISTING OPERATING STANDARD - EFFICIENCY MOTORS
WITH PREMIUM - EFFICIENCY MNITS IS NOT COST EFFECTIVE.

THE INCREMENTAL LUST OF REPLACING FAILED MOTORS WITH PREMIUM - EFFICIENCY RATHER THAN STANDARD - EFFICIENCY WITS IS TUSTIFIED IN MOST CASES SINCE THE ENVIRONMENT REGIMES IS ONLY THE ADDED LOST UP THE PREMIUM EFFICIENCY MOTOR. PETE REBATES REDUCE THE COST EVEN FARTHER, FOR EXAMPLE:

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20	Geo!	800	200	100	100	
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DATE	3/12			The same of the sa
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BETWEEN	Row	$-$ of $ \mathbb{R}^{\nu}$	172 ELGETRIC	431.5526
AND	RC. LENNIG	of <u>K</u>	46	
SUBJECT	FORT HUNTER LIG	4677 EEAP		
K&G PROJECT I	NO. 16-403-10	<u> </u>	•	
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THE Follow	wind ARE Lurrin	1 LIST PR	icos for Bal	OR SNAER-E
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REBATES 1	Frum PS+E:	Andrew Co.		
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25 30 40 50	1741 2,668 2,704 3,047	200 200	12,479 LIST PRIVE	

TO: KELLER & GANNON

PHONE: (415) 431-5526 FAX (415) 431 6430

BUZZELL ELECTRIC WORKS SINCE 1909

130 EIGHTH STREET

07-10-92 08:20AM P001 #24

DATE SENT: 10

PROJECT No .: __

	ATTN: CHRIS CASE FAX #:		ORIGINAL: JCE/FILE COPY: TMR
	REFERENCE: YOUR REQUEST	_ 4; EUL	hatas
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Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY_ CHECKED BY	Rel	EMLS FEASIBILITY	PROJECT 16-403-10
DATE	MARCH 1993		
REV	19	ECO # D10	SHEET NO OF 3 SHEETS
	APTION OF ACT		-
CANTRO	THIS PROJECT	MOULD INSTALL AN ENE MCS) FOR THE MAJOR E	RGY MONITORING AND
FACILIT	LES AT FORT	HUNTER LIGGETT TITE	SYSTEM WALL CONSIST
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		EVALUATED IS BASED ON	THE METHODOLOGY
Describ	BED IN TM	5-815-2.	
		G EMUS APPLICATIONS PRO	GRAMS ARE CONSIDERED
	RT HUNTER LI	99677:	
E-60	SCHEDULED S	TART / STOP	
B-18 -	OPTIMUM STAR	T/STOP	
B-1 •	DUTY CYCLING	1	
B-6 .	SUMMER/WINT	ER CHANGEOVER (OHM SAVINGS	ONLY)
E-6 .	DAY/ NIGHT S	ETBACK	
13-11 -	ECOMOMIZER		
	m pagament	A	
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B-5 •	HOT WATER O	MISIDE AIR DESET	
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FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY RUL	EMCS FEASIBILITY	PROJECT_16-403-10
CHECKED BY		
DATE MARCH, 1943		3.1
REV19		SHEET NO. 2 OF 34 SHEETS

B6 INSTALL TIME CLOCKS

BT PROVIDE NIGHT SETBACK/ SETUP

BIL INSTALL ECONOMIZER CYCLE

BIG ANTOMATE SummER/WINTER SWITCHOVER

INPAT/ DUTPUT POINT SUMMART

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FORM 101-1/8

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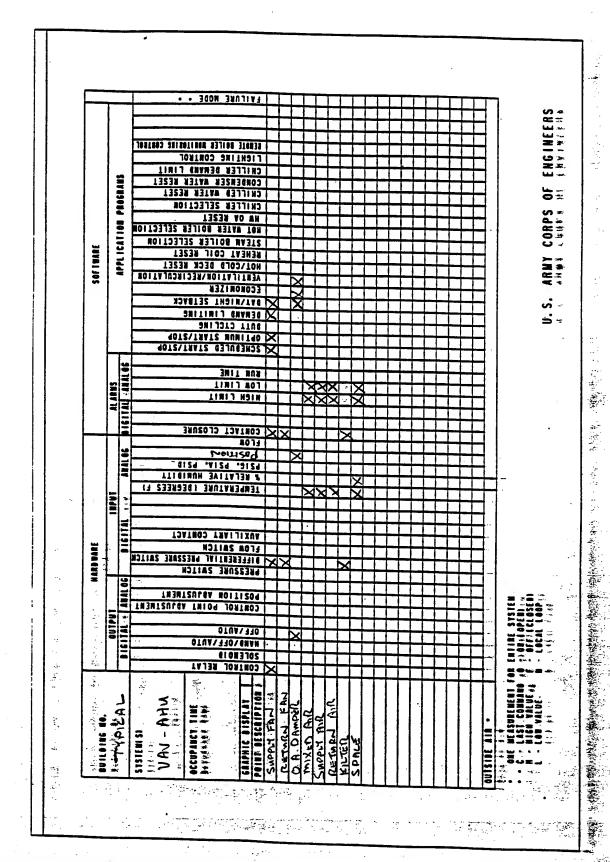
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SUMMARY OF EMCS MONITORING & CONTROL POINTS

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No.	SYSTEM TMPE	Quan.	Space Temp	DUCT TEMP	Lipuid Temp	Krow, LIGNID	POSITION	Oz Sensur	RH	PRESSURES WITCH	D. P. Switch, A.R	AUX. CANTACT		CPA			CONTRALLER O/R	CONTROL RELAY	
S182	SINGLE ZONE DX ALLU AIR WOLL DX CUMPR. ELECTRIC DAW HTR	2 2	2	6		- - - - - - -		-			6	4		-			7	レント	(19)
S186	SINGLE FORE DX AFA ALL DX COMPR	۱ <u>::</u> -ر -	1	3							3	2							P
P190	HW BOILER SINGLE ZONE DX AHM A.C. DX WMP. ELECTRIC DAW HTR	1221	Ĺ	3	5	2		_ 			3	3 2 1			-		l_	2 1	<u></u>
P197	SINGLE ZONE DX AHU A.C. OX LOMA ELECTRIC BHOW HTR	1	l -	3						 -	3	2		-			1		()
S148	warm air knowned	١	1	2						 1	2_	1			-			ک	(
PZOŚ # PZOŚA	DWAL DUCT AHM SINGLE ZUE DX AHM AIR LUCIED CHILER HW BUILER A.C. DR COMPRESSUR DHW CIRC. PAMPS ELECTRIC DHW HTR	1 1 1 2	4 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	3	19		2		14	2	87) 83	232	-	2					(Ç4)

Σ	Keller	&	Gannon
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Engineers-Architects

COMPUTED BY RCL	EMCS FEASIBILITY	PROJECT_16-403-10
CHECKED BY		
DATE MARCH 1993		10 -74
REV 19		SHEET NO. 19 OF HEETS

SUMMARY OF EMCS MONITORING & CONTROL POINTS

						Al:	۲_					D/1	٤		A/o	Ĭ	7	>/0	8
DLOG.	system Type	Фивн.	Space Temp	Ouct TEMP	LIGUID TomP	From, LIGNID	POSITION	OzSensor	R.H.		PRESSURE SWITCH	D. P. Switch, AIR	AAX. CANTACT	CPA			CONTRALLER OFR	CONTROL RELAY	9.
P206	HW BBILLER SINGLE ZOME DX AHA R.L. DX CAMPRESSUR ELECTRIC DHW HTR	2 2 1	2	26	10	4	, in	2		-	2	G	6 + 1				2	4 2 2 1	(<u>(</u>
P207 \$ P207A	HEW BOILER DUAL DUCT AHM SINGLE ZUNE BY AHM ALL BY COMPRESENT ELECTRIC DHW HTR DHW CIRC. Prumps	1 1 1 2	i † ∤	3	5 19	2	2		14.		2	3	3 2 1	2				211112	(
6508 V	HW BOILER DARLDUCT AHM SINGLE ZONE DX AHU AIL DX LAMP. ELECTRIL DHW INR. DHW CARC PAMPE	1 1 2	¥ 	3	19	2	2		14		2	3 3	3 2 1 7	2				2 1 1 1 2 2	€3
Pws	HW BOILER SINGLE ZUNE DX AM A.C. DX COMPR- ELECTRIC DHW HTTR	1		3	>							3	2 1				1	111	

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COMPUTED BY RCL	Emcs Feasibility	PROJECT 16-403-10
DATE MARCH 1993		
REV19		SHEET NO. 20 OF 34 SHEETS

SHAMARY OF EMCS MONITORING & CONTROL POINTS

				,		AI	エ					D /:	1			A/o		7	>/0	2
No.	system Type	Quan.	SPACE TEMP	DUCT TEMP	LIGUID TEMP	KLOW, LIGUID	DOSITION	Oz Sensbíl			Priessurg Switch	D. P. Switch, A.R.	AUX. CANTACT		CPA			CONTRALLER O/R	CUNTROL RELAY	
S2+1	SIMELY FOLK DX AHA AIR WOLED CHILLER ELECTRIC DHW HTR	1	1	3	ı				-		l.	3	2		1			i	1	(5)
PISZ	H.W. BOILER HW UNIT HEATER ELECTRIC DHW HTR	14	1	1	S	2	14	1		-	1 .		3						<u>ک</u> ۲	* *
S 283	POUPANT UNIT HEATER HEAT DAMP	3	-								*		3						3	ઉ
P287	SINGLE ZINE DX AHU AC. DX COMPRESSION	l I	}	3								3	Z					1	1	6
Szgo	SINGLE ZONE TAHA: AIR COOLED CHILLER DHW CIRC PUMP	1	1	3							1	3	2					1	ĺ	Œ
5291	SINGLE BOWS AHM AC DX LOMPROCEOR STERM BOILER	1	F 7.7	3	۲,	4	1					3	Ż 3	-)	1	6
5295°	17-W BOILER AIR CHUGA CHUGA FAN WIL MNIT	ा । ५३	1	\	5	~~1	•	t			-		3 2		<u>.</u>				2	21

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Engineers-Architects

COMPUTED BY RCL	EMCS FEASIBILITY	PROJECT 16-403-10
DATE MARCH 1993		
REV 19		SHEET NO. 21 OF 34 SHEETS

SUMMARY OF EMCS MONITORING & CONTROL POINTS

			_	,		AI	エ			-		D /:	I_	 L	A/c		7	>/0	2
No.	SYSTEM TYPE	фиан.	Space Temp	DUCT TEMP	Ligaid Temp	KLOW, LIGNID	POSITION	Oz Sensur	R.H.		PRESSURE SWITCH	D. P. SWITCH, AIR	AUX. GANTACT	CPA			CONTROLLER O/R	CONTROL RELAY	
P210	H w Boilér Air Lucien Chillér Ahn - Ox A.C. Dx compréssur	t t	1	3	5 1	2		1	-		1 1 3	,	3 2 2	*			1	2111	(3 ?
PZIZ	MARM ATR KARNAUS A.C. DX LOMPRESSUR	l l	1	2					-			2	1 2					2	(i)
P224 \$ P224A	H.W. BUILEIL DARL DALT AHA SINGLE FUNE DX AHA A.L DX LUMPR. ELECTRIC DHW HTR DHW LIRC PAMPS	1 1 1 2	14 1	3	5 14	2	Z		. **		1 2	3 3	3 2 1	2			1	211112	(8
P230 † P236A	HW. BUILDR DNAL DUCT AIM SIMPLE BUE DR AIM A.C DR COMP. ELECTRIC OHW ITR. DHW CIRC. PAMPS	1 1 1 1 2	(4)	3	5 19	2	2		14		2	3	- M W	2		,		2 1 1 1 2	(E)
7338	VAV AHM IT W. BOILER A.C. DX COMPRESSUR DITH CIRC PAMP	1	ł.	3	5	2	-	_	1		-	3	3 2				1	1 2 1	(31

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COMPUTED BY RCL	EMCS FEASIBILITY	PROJECT 16-403-10
DATE MARCH 1993		
DATE TOTAL 1995		77 31
REV 19		SHEET NO. 22 OF 34 SHEETS

SUMMARY OF EMCS MONITORING & CONTROL POINTS

						Al:	Ľ					D/:	٢			A/c	}	7	>/0	
No.	system Type	Quan.	Space Temp	Ouct TEMP	LIGUID Tamp	FLOW, LIGHID	POSITION	OzSensur	R. H. SENSOR	Kw/Kwit	Pressure Switch	D. P. Switch, AIR	AJAK. CANTACT		CPA			CONTROLLER O/R	CONTROL RELAY	
			S		Ī	Ϋ́	ď	0	کا	¥	8		A.A.		J					_
P301	AHN - DX	1	١	3								3	2					ì	1	6
	A.C Dx compression	1						·	-				6						,	
	Compater RM AIC	4	_		0	**	cn	TIL	L -	_	_									
-	KMIKMH - HO AREA	1			·	. .			-	١.		-								
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					-														- 3	
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-				_		*	_	_		_	_	_	_	_	_	<u> </u>	_		_	
	STSTEM TOTALS	,	IH.	ĸś	184	34	27	15	71	1	36	94	160		20			33	1860	1
												30		- 77			1		1	'
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COMPUTED BY RIH	ECOD-10 FMCS
CHECKED BY EIH 1913	CHILLED HATER RESET
REV19	

PROJECT 16-403-10 FITL EEAP SHEET NO. 23 OF 34 SHEETS

RESCRIPTION OF ACTION PAGE THE CHULED HATER TEMPERITURE TO FOLLOW THE LOND, HETTLU A LIMIT SHITEM IN EACH MODULATING OTZ DIVERSION MALVE TO MEASURE LINED THE VALVE IS FLILLY OPEH OR FIRETALLY OPEH. HERANGE THE CONTROL CIRCLIS SO THAT HHER ALL COIL COHTROLVANIES ME ETTETZ CLOSED OR IHAPARTIALLY OPEH POSITION (HOICHTHA LIGHT WAS COTDITIONS), THE CHILLED HATER TEMPFRATURE SUPPLY SET POINT SHOULD BE RAISED WHILL OHE CR MORE COIL CUITTEON VITAVES RETURN THE FULLY OPEH POSITION. FACILITIES THELUIDES 241 ENTERRY SAVINGS BASED OH KEVISED COP'S GIVEH A RISE IN LATER TRI PRESIDENCE LITELL OUTSIDE TEMPERATURES ATE HOVE 30" BUT BELOW 92"DD ES THE ADJACENT FIGURE FROM DOIS. ELITIZAY COTSTICUATION IN EVISTING CULDWAS IS USED.

LEAVING CHILLED WATER TEMPERATURE

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Engineers-Architects

COMPUTED BY	ZUB	FLOTO:	EMUS	PROJECT 16-403	<u>-10</u>
CHECKED BY	2ch 1993	CHLLEDIJAN		FIR EEAP	
DATE MASS	19_1	COST SAN		SHEET NO. 24 OF 34	SHEETS
REV.	10	W31 31	11777 2	. 0 0	
		DATS @ 99	0 -2 - 26	- 9-	
	LINA DECIME	- DRIS C_ 7	5 1715 5		
		@ 80	2 D3: 11	53	
	AV9. EFF	CHEHCY IMPR	WATENT		
					· · · · · · · · · · · · · · · · · · ·
	(10) - (0)	x/ 1163-30	5-8 \ = -	3-5-1/-	
	(11.61.016.7	1153)		
		(. 115 . 5			-
	CHUE	2 EHERRAY U	SEAME SUM	imazy	W
aca f	SWALL ILEMS	HEN USEAGE	SAVIHAS	SAMILAS	
and 1	AND ITY USERIAN	(KUH140)	(VI)11/42)	1/20	
	(CMH / 7K)				
101	2744	2,648	96	\$ 7 00	
	<u> </u>				<u> </u>
128	29,186	28,164_	_1,021	\$ 7600	
210	24,434	23,579	855	\$6400	
241	6,431	15,856	-575	\$ 43 000	
			137	\$1000	
290	3,706	3769	121	310	
295	81379	78,531	2848	\$ 212 \$	
	31,311				
+					
					187
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FORM 101-1/8

CONSTRUCTION COST I	ESTIMA.	TE		DATE PREPARED MARCH			SHEET 7	5 of 74
PROJECT EEAP LIMITED ENERGY S					1	OR ESTIM		
LOCATION							n completed)	
FORT HUNTER LIGHETT, CA				CODE B (Preliminary design) CODE C (Final design)				
KELLER & GANNON					□ • ·	THER (Sp		
DRAWING NO.		ESTIM	ATOR	RU		CHECKE	D BY R	aH
ENERGY MONITORING 4	QUANT	ITY		LABOR		MATERIA	Ļ	
CONTROL SYSTEM	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER UNIT	то	FAL	COST
COST SUMMART								
CENTRAL LONTAN HARDWARE	<i>-</i>			1,200		1	8, 176	19,370
SOFTWARE				63,250			_	63,250
TEST EULIPMENT				-		2	3,006	23,006
REMOTE EMCS COMPONENTS				477,115		591	3,885	1,068,000
DATA TRANSMISSION STSTEM				2,910		15	350	18,260
System testing				98,450			_	98,450
TECHNIAL DOLLMENTATION				49,550			-	49.550
MAINTENANCE CONTRACT				58,000			-	58,000
OPERATOR TRAINING				12,750			1	12,750
		2						
SUBTOTAL				763,225		64	7,405	1,410,636
SALES TAX e 8%.						4	31,790	51,790
SUBTOTAL								1,462,420
CONTRACTOR OHA PROFIT @ 30%.								438725
SURTOTAL								1,901,145
BOMD @ 10%								19,610
SNBTOTAL								1,920, 155
ESTIMATING CONTINGENCTEDY.								192,015
TOTAL POWRABLE								,
CONSTRUCTION COST								2,112,170
TUTAL LOST - R	ころりいつ	b						2,100,000
								-

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARED MARCH 19	1943 SHEET 26 OF 36			OF 34	
PROJECT EEAP LIMITED ENERLY	YOUTZ					OR ESTIM			
LOCATION						-	(No designal)		
FORT HUNTER LIGGETT, CHARCHITECT ENGINEER	-					CODE	(Final de	_	
KELLER & GANNON					°	THER (Sp	eclfy) ——		
DRAWING NO.		ESTIM	ATOR	Ru		CHECKE	g Year	14	
ENERGY MONITORING &	QUANT	ITY		LABOR		MATERIA	L	1	
LIMTROL SYSTEM	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER	70	TAL		COST
(5-1700) (-170-) Nanon									
CENTRAL CONTROL HARDWARE	<u> </u>				 	ļ		-	
1. Superlyisory Latral								 	
CENTER COMPATER (ISM PS/2)	1	A					1,900	<u> </u>	9,900
2. ALARM & LUGGING PRINTERS	2	EA			660	1	320	<u> </u>	1,320
3 LINE COMDITIONER /NPS	(ΕA				1	,250	<u> </u>	1,250
4. DIAL-AP MODEM	1	EA					700	<u> </u>	700
5. STREAMING TAPE BACKERP	1	EA	-			Š	(000)	<u> </u>	5,000
6 LABIR	40	MX	30	1,200					1,200
SUBTOTAL				1,700		18	1170		19.370
SOFTWARE								<u> </u>	
		LS	-	12 200		<u> </u>			12
1. CUMMAND SOFTWARE Z. APPLICATIONS PROGRAMS		LS		13,000					13,000
3. DATABASE GENERATION	1,130	PT	25	22,000 28,250		-		†	25,000
SNBTUTAL	1,7-2					-		, v,	28,240
3//3/- //				63,24,0	(r)			<u> </u>	63.250
TEST EQUIPMENT							·		
1. FID SIMULATOR		EA		500		15,	٥٥٥		15500
2: PORTABLE KID TESTER		EA	_	_	1	7	Sob		7,500
SARTUTAL				500			500		23,000
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<u>:</u>						1		12 17	ूर्ण कर्ते. इ.स.
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CONSTRUCTION COST	ESTIMAT	ΓΕ		MARCH 1993 SHEET 27 OF 3			7 05 34		
PROJECT	TUNY				BASIS FOR ESTIMATE				
EEAP LIMITED ENERLY S					CODE A (No design completed)				
FORT HANTER LIGHETT,	LIGHETT, LA				CODE B (Preliminary design) CODE C (Final design)				
ARCHITECT ENGINEER KELLER & GANNON						OTHER (Specify)			
DRAWING NO.	· · · · · · · · · · · · · · · · · · ·	ESTIM	ATOR		CHECKED BY			. 13	
				RCL	l			1 14	
ENERGY MONITORING \$	QUANTI	UNIT	PER	LABOR	PER	AATERIA		TOTAL	
CONTROL SYSTEM	UNITS	MEAS.	UNIT	TOTAL	UNIT	10.	TAL	COST	
REMOTE EMCS COMPONENTS									
1. REMOTE TERMINAL MUIT (FID)	٠,4	EA	480	21,600	6,120	2-	75,400		
Z. SPACE TEMP. SENSOR	ht	£Α	282	32,148	205	7	3 370		
3. DULT TEMP. SENSOR	155	EA	396	61,380	305	4	7,275		
4. SPACE 1 J.A. REL. HUMIDITT	71	EA	282	20,022	605	7	2,955		
S. GARE PRESSURE, LIGHID	_	έA	426		625		-		
6. DIFF. PRESSURE, LIGHID	-	EA	570	*	895		•		
7. FLOW SERSOR, LIGNID	34	ΞA	480	16,320	1,155	3	9,270		
8. DAMPER/VALUE POSITION	27	EA	327	8,819	315		8.505		
9. KW/KWH TRANSONCER	١	ÉA	267	267	584		480		
10. OXYGEN SENSOR	15	EA	282	4,230	750		11,250		
11. PRESSARE SWITCH, LIGHID	36	EA	417	15,012	250		9,000		
12. DIFF PRESSING SWITCH AIR	94	EA	297	27,918	145		3,630		
13 AUXILIARY CONTACT	160	ÉΑ	285	45,600	85	1	3,600		
17 CONTROL DOINT ADJ.	20	EA	411	8,220	760		5,200	•	
15. UNTROLLER DIERRIDE	33	EA	327	10,791	350		11,550	•	
16 WINTROL RELAY	186	EA	270	50,220	90		16,740		
17 LIQUID TEMP	184	EA	84o	154,560	340	_6	2,560		
SUBTOTAL				477,117		59	0,885	1,068,002	
1 Inchases RADIO TRANSCENER								0.0	
DATA TRANSMISSION STSTEM									
1. HEADEND TRANSCENER	1	EA	240	240	6500	(6,500		
2. HEADEND ANTENNA	1	EA	60	60	750		750		
3 RADIO TOWER	1	ÉA	1,260	1,260	1,500		1,500		
4. CEMOTE AUTEUNA (G.SJB)	15	ÉA	30	450	280		4.200		
5 RETUTE ANTENNA (2.518)	30	ÉA	30	900	80		2,400		
				-					
SUBTOTAL				2,910		15	5,350	18,260	

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARED	1493		SHEET	28 of 32	
PROJECT				<u> </u>	_	OR ESTIM			
LOCATION ENERGY	STND	۲		•	<u> </u> 12	CODE A	(No desig	n completed)	
FORT HUNTER LIGHETT,	CA				1 —	ODE B (P			2
ARCHITECT ENGINEER						CODE C		elgin)	To Applicate the Park
KELLERS GANNON DRAWING NO.		leer.	ATOR						
		ESTIM	IA I UK	Rcu		CHECKE	D BA B	अमे	
ENERGY MONITORING \$	QUANT	ITY		LABOR		MATERIA	L		
CONTROL SYSTEM	NO. UNITS	UNIT		TOTAL	PER	то	FAL	TOTAL COST "	
	1								
STSTEM TESTING			<u> </u>		-				Se Residence Services of the Control
1. FACTURY TEST	-	LS	-	_	_			5,000	**************************************
2 FIED TESTING		PT	65	73,450					
	1,130	1	103	13,750		ļ		73.450	
3. VERIFICATION \$	-	1.0							
ENDARANCE TESTS	ļ	LS	-	-	-		-	20,000	-
SNBTOTAL	 	├	ļ					98,450)
TECHNICAL DOCUMENTATION									William Ave.
1. TECHNICAL DATA PKG.	1	-							
		LS						7 m	
- Lump Sum	1.2	 		20.44		<u> </u>		20,000	
- POINT LUSTS	1,130	PT	35	39,550			_	39,550	200 m
SURTOTAL								49,550	7 ·
MAINTENANCE CONTRACT							· · · · · · · · · · · · · · · · · · ·		e e e e e e e e e e e e e e e e e e e
1. KIRST YEAR MAINTENANCE									1
e 11% of Instauco									画の 1-2 最 :
EQUIPMENT COST	<u> </u>	LS		-	-	<u> </u>	<u> </u>	58,000	を
SNRTOTAL	 				· · · · ·			58,000	
OPERATOR TRAINING				,				28,140	* 43
1. Training Sessions									*
		LS	_		_				
- Lump Sum - PER STUDENT LISTS	3	EK	1,750			<u> </u>	•	7,500	
12/2 3/19541 (031)	3	ž.	1,130	4.					
SUBTOTAL								12,750	
								/6	
	<u> </u>	Ą	:		-				
					-		<u> </u>		
		, in	:		÷	7			

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Engineers-Architects

COMPUTED BY RCL	EMCS FEAS	SIBILITY	PROJECT_	16-403-10	<u> </u>
CHECKED BY			SHEET NO.	29 OF 36	SHEETS
REV19	- A				
SENSORS & INSTRUMENT	AT - UN	IT POINT CO	ST Drevelopme	NT 11	
DEMONICS 4 THATIOMBAL	H CON - CO				
ANALOG INPUTS		MAT'L LOST	LABOR MH	LABOR WIST	
SPACE TEMPERATURE	B. cope .				
RTD & TRANS		150	1.4		
Wiring & UND		· ··· 55-	6.0		·
TERMINATIONS		_	2.0		
TOTALS		205	9.4 € 30	= 282	
DUCT (AUG) TEMPERATU	ive				
AVERAGING RTD 4		250	42		
WIRING & CONOM	1		6.0.		
TERMINATIONS			2.0		
TOTALS		305	13.2 c'30	= 396	
LIQUID TEMPERATURE					
RTD + TRANSM		200	1.5		1111
THERMONELL		85	4.5		
WIRING + COND			6.0		
TERMINATIONS			2.0		
TOTALS		340	14.0 630	= 840	
SPACE/OA RELATIVE HU	MINITY				
SAUCE LAN ICERATION IN		-550	1.4		
WIRING & CONC		\$\$	6.0		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	(n))		_2,0		
TERMINATIONS		605	9.4 6 30	282	. a ye 77 Per
TOTALS					111
GANGE PRESSURE LIQU	AID				
PRESSURE TRAN	SMITTER.	525	3.2		111
TAP		45	3.0		
لنابالاسلم في للمال	DNIT		6.0		
TERMINATIONS	S		7.0		
70741		625	14.2 e 30 =	426	

FORM 101-1/8

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COMPUTED BY RCL	EMUS KEASIBILITY	PROJECT_16-403-10
DATE MARCH, 1993		
REV19		SHEET NO. 30 OF 34 SHEETS

ANALOG INPATS (CONT'D)		MAT'L LIST	LABOR MH	LABOR COST	
<u> </u>					
DIFFERENTIAL PRESSURE, LIV	bwD				
D.P. TRANSMITTER		750	5.0		,
Prossure TAPS (2)		90	6.0		
WIRING + CHOMT		<u> </u>	6.0		
TERMINATIONS			2.0	<u> </u>	
TOTALS		895	19.003	\$ -570	
Principle of the Control of the Cont	<u> </u>				-
FLOW, LIGHTD		06			-
D.P. (KLOW) XMITTER		850	5.0		1 1
AVERAGING PROT TUBE		250	3.0		
WIRING + COMONIT			6.0		
TERMINATIONS			7.0		
TOTALS		1122	16.0 e 3	480	
DAMPER / VALUE POSITION				** ***********************************	
POTEN-NOMETER		170	2.5		
TRANSONCER		1.70	0.9		
WIRMY & CONDAIT		70 <u></u>	•		
· ·			6.0		
TERMMATIONS			2.6		
TOTALS		313	10.9 = 30	• 317	
ELECTRIC POWER !					
WATT TRANSDIKER		525	6,9		
WIRING & CONONIT		55	6.0		
TERMINATIONS			2.0		
TOTALS		580	8.4 6 31	167	
Existing Cts + PT's			·		
					1 1 1 1 1
	111.				1111
		· · · · · · · · · · · · · · · · · · ·			

Keller & Gannon

re <u>Μαλυή 19</u> 93 /19			SHEET NO	31_of	34 SHE
DIGITAL INPUTS	MAT'L WST	LAROY	RMH	LABOR	<u> </u>
PRISSIANE SWITCH, LIQUID					
GANGE PRESSURE SWITCH	150	3.7	-		
PRESSURE TAP	45	. 2.7	,		
WIRING + CONDINT	55	6.0			
TERMINATIONS	<u> </u>	2.0			
TOTALS	250	13.9	2 ⁷ 30	= 417	<u> </u>
					-
DIFFERENTIAL PRESS. SWITCH, AIR	0	1.9			
AIR D. P. SWITCH	90	•			
WIRING 4 COMONIT	\$\$	6.0		***=*	
TERMINATIONS	114.0	2.0		= 297	
TOTALS	145	4.1	2 30	- 511	
		• • •	• •		
AUXILIARY CONTACT				- du phrasant trade	
TERMINAL STRIP	30	1-5			
WIRING & CONDAIT	55	6.0		-	
TERMINATIONS		2.0			
TOTALS	85	9.5	- e*3i	285	
Experience of the second secon					
AMALOG ONTPUTS		-			
CONTROL POINT ADJUSTMENT		- 6.			
CPA CONTROLLER, PNEUMATIC	160	1.8			
I/P CONVERTER	250	1.0			
CONTROL RELAT	35				
EPVALVE	230].0			
PRESSURE REGULATOR	30	0.5			
WIRING & WNDAIT	-\$5	6.0			
TERMNATIONS		20	- 2		
TOTALS	7.60	13.7	6 -30	* <u>411</u>	

COMPL	JTATION	SHEET
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Keller & Gannon

COMPUTED BY RUL	EMCS FEASIBILITY	PROJECT_16-483-10
DATE MARCH, 1993		·
REV 19		SHEET NO. 32 OF 34 SHEETS

DIGITAL" OUTPUTS"		MATIL LOST	LABOR MH	LABOR COST	
				9	
CONTROLLER OVERTU	DE				
CONTROL RELAY		35	1.6		
EP VALUE		236			
PRESSURE REGULAT	15/2	30	0.9		
	•		6-0		
WIRING & CHONIT					
TERMINATIONS			2.6		
TOTALS		350	10.9 € 3	0 = 327	
CONTROL RELAY					· · · · · ·
INTERPOSING RELAY	,	36	1.8	- PAR ALLES CONTRACTOR	
WIRING & CONDWIT			6.0		- 1
TERMINATIONS	·		Z-5		
		901			
TOTALS		96	7.0 6 >	s = 270	
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Keller & Gannon

Engineers-Architects

COMPUTED BY FARE	FLO D-10 FMCS	PROJECT <u>V-403-10</u> Fitz EMCS
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FORM 101-1/8

Keller & Gannon

COMPUTATION SHEET

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Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

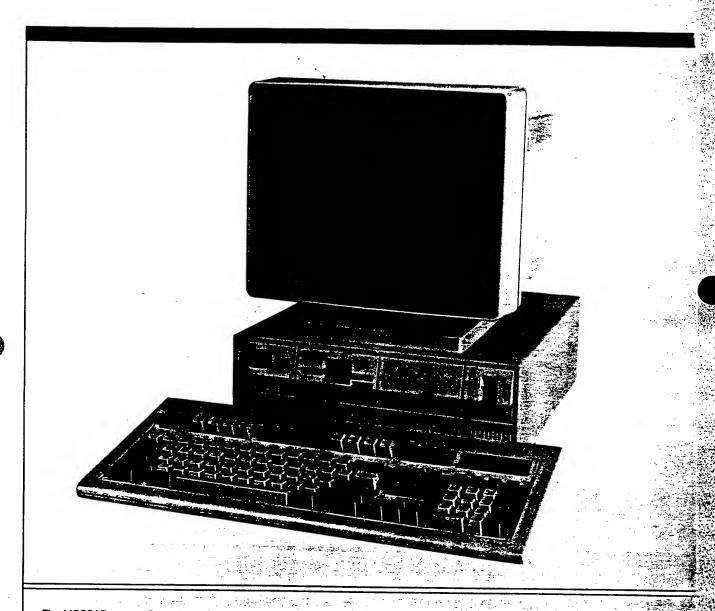
ECO D-10 Sheet **34** of **34** -

Location: Project Title	Fort Hunter Lig	gett, California	Region No. 4			Project No. 16- Fiscal Year FY	403-10 '96
Discrete Pol	rtion Name: ECO#	¥D-10					
	te: March 1993		Economic Life:	15 YEA	RS	Preparer: KELL	ER & GANNOI
1. Investme	nt Costs						
A. Construc	tion Costs		\$2,100,000	•			
B. SIOH			\$115,500				
C. Design C	Cost		\$126,000				
D. Total Co	st (1A+1B+1C)		\$2,341,500		44		
E. Salvage	Value of Existing E	quipment			\$0		
F. Public Ut	ility Company Reb	ate			\$12,065)	- *0 000 405	
G. Total inv	estment (1D-1E-1F)				\$2,329,435	
. =							
2. Energy S	avings (+)/Cost(-):	d for Discount Factor		•			
Date of Nis	11H 03-32/3-X USG	d for Discount i doton					
Energy	Cost	Saving	Annual \$	Disc	ount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Fact	or(4)	Savings(5)	
Source	Ψ/ΙΝ1ΕΟ/(1)	10,510, 111(2)					,
A. Elec.	\$21.84	1,841.0	\$40,207		11.70	\$470,427	
B. Dist	\$4.98	2,460.0	\$12,251	-	13.78	\$168,816	
C. Propane	\$7.87	3,399.0	\$26,750		14.16	\$378,782	
D. Demand	\$108.6	112	kW = \$12,128		11.70	\$141,896	
E. Other		<u> </u>					
F. Total			\$91,336			\$1,159,921	
3. Non Ener	gy Savings (+) or	Cost (-):		•			
A Annual B	ecurring (+/-)		(\$5,200)				
	t Factor (Table A)		(00)000)	-	11.12		
(2) Discoun	ted Savings/Cost (3A x 3A1)				(\$57,824)	
(2) 5.000	iou cumge, care						Atom .
B. Non Rec	urring Savings (+)	or Cost (-)	. * * 5				
item	Savings(+)	Year of	Discount	Dose	counted Sav	/-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings	(+)Cost(-)(4	!)	\$.
a. *			. *			_	
b. 🕫			y an			_	
C. 1.						-	**
d. Total							
C Total Nor	n Energy Discounte	ed Savings (3A2+3Bd	4)	(\$57,824)		
4 Cimmle D	outbook 10//052 : 9	A+BBd1/Economic	l ifa))•		27.0	Years	
		A+(3Bd1/Economic	۵.0 _{//} .		\$1,102,097	•	
	Discounted Saving				0.47		

7. Adjusted Internal Rate of Return (AIRR):



MOSCAD Motorola SCADA IGC/M Supervisory Control Center



The MOSCAD system Supervisory Control Central (IGC/M) will provide necessary central stations functions in a MOSCAD Supervisory Control and Data Acquisition (SCADA) system. When connected to the appropriate Front End Processor, the GC/M is capable of monitoring and controlling MOSCAD remote terminal units via either conventional or trunked two-way radio, microwave backbone, or (with appropriate interface) multi-drop wire or fiber optic communications media. The video display offers high quality color presentations of alarm and of system status and telemetry conditions using either character or pixel graphics and alphanumeric text.

The IGC/M central may consist of a single computer that provides system information to a single operator.

Or several computers may be configured in a Local Area Network (LAN) to pass/share system data among several operators.

The industry standard IGC/M central software is a menu-driver database package that is completely user definable. Built-in prompts and help screens support definition of graphic displays, data calculations, automatic control sequences, text messages, and reports. Selected events and system activities are automatically logged to the system printer and hard drive for future suse. The multi-tasking capability of the software allows you to add-to or modify your system database while the central continues to perform its monitoring and control functions.

MOSCAD System IGC/M Central

Feature/Benefit

Industry Standard SCADA Software—The IGC/M software package, based on THE FIX/DMACs™ SCADA software, provides a powerful data acquisition, control, and display package that can be easily tailored to match your system needs.

Supports a comprehensive package of data acquisition and control functions plus man-machine interface (MMI) that are normally found only on large expensive computer based systems.

Standard IBM PC Computer—The IGC/M software runs on an IBMTM PS/2 386-type computer, mixing easy operator interface with the flexibility to handle the full capability of the MOSCAD remote terminal unit.

Allows the system operator(s) to efficiently monitor and control multiple MOSCAD remote terminal units via conventional or trunked radio, microwave baseband, or multidrop (leased and dial-up) wire or fiber optic communications media.

High Resolution Color Character or Pixel Graphics Display—An IBM PS/2 color display, along with either the standard 128 symbol ISA instrumentation character set or pixel graphics allows construction of dynamic visual displays that can represent any system operation.

Allows you to build highly detailed color graphic screens that can visually alert your operators to changing system conditions. This type of visual information can enable them to react quickly with great accuracy to system problems.

Multi-Tasking Capability—The IGC/M can run, under standard IBM PC DOS, foreground and multiple background tasks.

Allows operators to edit the system data base or print special reports while the central is performing its normal monitor and control functions.

Data Acquisition—The IGC/M can monitor and report on the condition of multiple digital, counter, and analog inputs from each of the MOSCAD remote terminal units in the system.

Allows the reporting of digital alarm or status changes, such as intrusion/fire alarms and pump runtimes, and the values of analog inputs or calculated data, such as motor speed, fluid levels and flows, and statistical averages.

Supervisory Control Outputs—The IGC/M can manually or automatically (by schedule or event) generate digital or analog control outputs to a MOSCAD remote terminal unit.

Provides for the direct control of electrical devices, such as motors, pumps, valves, emergency sirens, or tower lights. Also, allows you to proportionally control valves and vary the speed of fans or motors to change remote operating conditions.

System Printers—A printer may be connected to each IGC/M to record selected system alarms, status changes, and control actions. Add a second printer, either locally or remotely, for system reports.

Allows you to keep a printed log of selected system transactions while simultaneously printing system reports.

Secure Signalling—All IGC/M messages are transmitted using MDLC, a 7-layer OSI packet-type signalling format that was specifically developed to handle large amounts of data on two-way radio communication channels.

Ensures accurate and reliable operation with no faise or erroneous controls, even during conditions with a high level of noise.

Contention or Polling—The IGC/M receives and displays status and analog value changes sent in autonomously from MOSCAD remote terminal units (contention) and/or in response to an interrogation (poll) generated by the IGC/M.

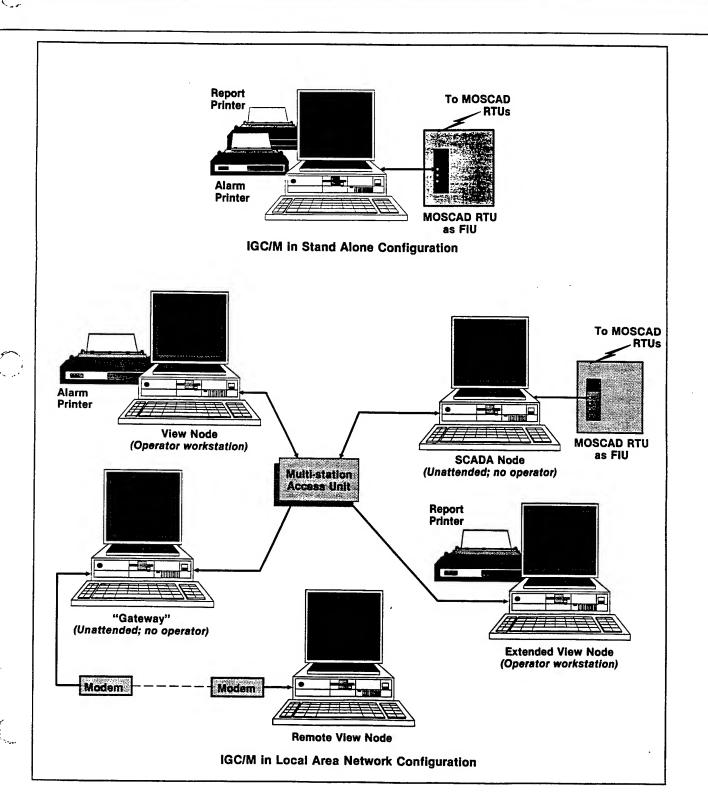
Contention reporting provides the IGC/M with fast screen updates of alarm or changes in monitored analog values. Polling ensures the timely update of the IGC/M's data base and detection of potential remote terminal unit failures.

Automatic Data Base Preparation—Significantly reduces the time required to make the IGC/M operational by integrating each MOSCAD RTU's data base into the central.

Preparing the display screens and linking dynamic display elements to the data base is all that remains.

Broadcast Capabiltly—Commands and messages may be sent to groups of RTUs. The groupings may be changed dynamically.

Multiple RTUs will respond to a single broadcast transmission to simultaneously control multiple devices at multiple sites. The groupings need not be predefined during system design.



MOSCAD System IGC/M Central

Specifications

opecincations	
Hardware: Computer:	IBM PS/2 386-type (such as Model 55SX) computer with a 4 Mbyte RAM, one 60 Mbyte hard disk, one 3.5"
Software:	high density floppy disk drive, math coprocessor, 2 serial and 2 parallel ports, mouse, and a 12" VGA color display. Alarm & report printers as needed. (LAN hardware required in network configuration). THE FIX/DMACS with MOSCAD driver. DOS V3.3 and QEMM386 included.
Display Formats:	Character Graphics: 80 columns by 25 lines; 16 colors Pixel Graphics: 640 x 350 pixels (EGA mode) or 640 x 480 pixels (VGA mode); 16 colors Use an appropriate MOSCAD RTU model.
I/O Capability: Control Modes: Interrogation Modes:	256 RTUs with 3000 total I/Os (total I/Os per Stand-alone or SCADA node.) Manual control; automatic loop control Manual, event triggered, and scheduled. Rates adjustable from 1 second to several days in 1 second increments in multiple schedules or at predetermined dates, days and times.
Node Type: Stand Alone:	SCADA and VIEW, RTU interface with pixel graphics, historical trending, report generation, scheduler capability, and alarm handling.
LA.N.:	SCADA node: RTU interface with pixel graphics and scheduler capability. View node: pixel graphics and alarm handling. Extended View node: pixel graphics, historical trending, report generation, scheduler capability, and alarm handling. Maximum number of nodes: 16.
General: Power: Temperature:	117 Vac 60 Hz (800 VA per node); 230 Vac 50 Hz available Operating: +15 to +32°C; 8 to 80% relative humidity, non-condensing







Support Services

Support services

Wherever Motorola sells, our product is backed by service. In the U.S., we have 900 authorized or company-owned centers. In addition, our products are serviced throughout the world by a wide network of company or authorized independent distributor service organizations.



MOTOROLA

1301 E. Algonquin Road, Schaumburg, Illinois 60196 Telephone toll-free 1-800-247-2345 In Canada: 4000 Victoria Park Avenue North York, Ontario M2H3P4 Telephone: (416) 499-1441

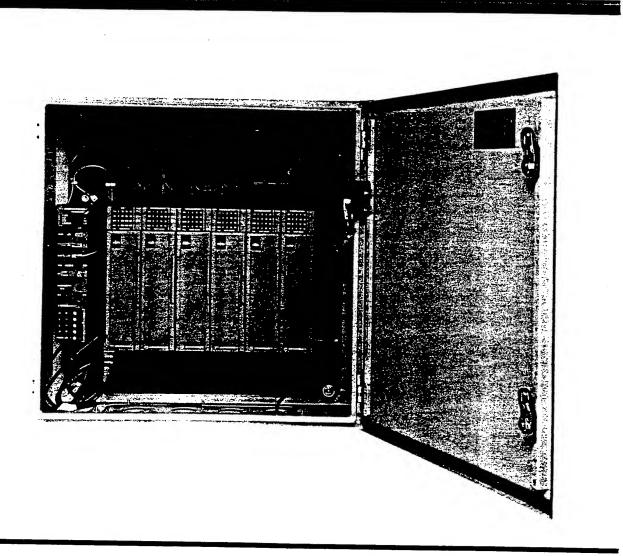
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R3-11-79



MOSCAD Motorola SCADA Remote Terminal Unit



Product Overview

The MOSCAD Remote Terminal Unit (RTU) provides a data collection unit with the intelligence required to operate in sophisticated Supervisory Control And Data Acquisition (SCADA) data systems. With MOSCAD, local processes can be thoroughly supervised; control decisions, utilizing data from both local and remote sources, can be made; informational messages to supervisory centrals or to other remote units can occur. MOSCAD utilizes reliable Motorola FM two-way radio as the message transmission medium to completely eliminate dependence on leased wireline networks.

MOSCAD can automatically make the control decisions required to manage the local process—no instructions or intervention by external supervisory equipment is required. These control, and other, actions are defined within MOSCAD in an advanced ladder-language format; the SCADA Application Development software program is available to assist in this effort. MOSCAD uses the MDLC communications protocol, which was specifically designed to transmit large amounts of data via FM two-way radio, when communications with supervisory or other remote units is required.

MOSCAD, Motorola SCADA, Remote Terminal Unit

Feature/Benefits

Local intelligence—MOSCAD is a microprocessor based RTU with large memory capacity that can locally make control decisions based on status conditions and values from local and remote sources.

Local intelligence permits control decisions without the need for real-time messages from other supervisory centers; MOSCAD can operate in sophisticated control systems.

Ladder Logic—MOSCAD uses an advanced symbolic *ladder-logic application language* to develop the data base conditions, values, and RTU profile that must exist for each control action, message transmission, etc. to occur.

Powerful applications may easily be defined using industry accepted ladder logic. The task is made easier by using the SCADA Application Development software and an IBM PC computer.

MDLC—MOSCAD uses the MDLC communication protocol for all data signalling.

Specifically developed for two-way radio use but completely applicable to wireline, microwave, and fiber optic media, MDLC permits large volumes of data to be quickly transferred between terminals using packet transmission techniques.

Upload/Download—MOSCAD, via the MDLC data transfer capability, uploads the data collected and calculated by the application program to a central site and receives downloaded changes in the application program and in the parameters that control how the application operates.

The process being supervised need not be static; operational variables and limits, and the process definition itself, can be easily changed and transmitted to the RTU. Site visits by maintenance personnel are not required.

Diagnostics—MOSCAD incorporates self-diagnostic software routines to help maintenance personnel identify and correct operational problems. The ladder-logic application itself can log operational problems and transmit that data to a supervisory terminal using MDLC.

Self diagnostics and error reporting capabilities, plus local LEDs, permit maintenance personnel to repair malfunctions in the shortest possible time.

Communications—MOSCAD permits communications to occur RTU-to-central and RTU-to-RTU. Communications may occur between individual units or may be "broadcast" to several units simultaneously.

Communications between any or all units in the system may occur.

Modular—The core capabilities of MOSCAD are present in the CPU module. Other modules provide digital and analog input and output capabilities. Each module provides LED indicators that monitor the operations of the module.

Modular construction permits configuring each RTU to meet the precise requirements of each application, and permits future expansion as the application expands. Maintenance personnel need only to replace modules to restore proper operations.

CPU Module—The CPU module contains the microprocessor and associated RAM/ROM to control the connected I/O modules, the radio, and the communication ports.

All core functions, including system, application, and communication software, are contained in this module.

I/O Modules—Digital and analog input, digital and analog output, and combination input/output modules are available for those on-site inputs and outputs.

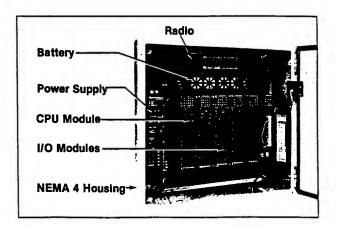
The digital Input module includes high-speed counter capability. The relays on the digital output module provide either momentary or latch operation.

RS232/RS485 Ports—Connectors on the CPU module permit the connection of a terminal for application programming, a second terminal or printer for local operator I/O, and the radio.

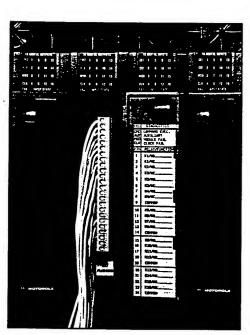
Multiple connectors, multiple communication protocols, and variable data speeds allow practically all external Data Terminal Equipment (DTE) to be connected to the CPU module.

Dual Power Supply—MOSCAD is available with dual power supplies: a battery capable of fully powering the RTU, and an ac operated power supply that also recharges the battery.

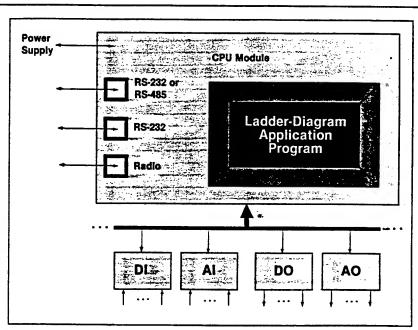
Dual power sources insure continuing operation during ac power failures.



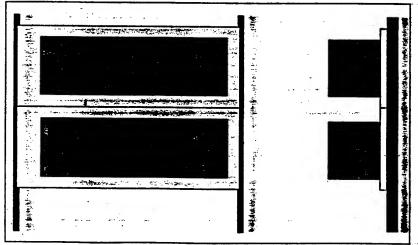
The CPU Module controls all operations



Rack-mount with space for 15 I/O modules



Plug-in I/O module showing LEDs and user connector



MOSCAD, Motorola SCADA, Remote Terminal Unit

Specifications NEMA-4 steel enclosure (1-6 modules): 19.7" × 19.7" × 8.3" Physical: General Rack mount (1-8 modules); 19" × 10.5" Dual: provides 13.8 Vdc @ 7A from 120/240 Vac 50/60 Hz; 13.8 Vdc 5 A-h battery **Power Supply:** -30 to +60°C; 96% RH @ +50°C **Environmental:** Maximum 248 modules in racks of 16 (additional power supplies required) Expansion: 68302 (16/32 bit); CMOS; 16.6 MHz clock **CPU Module** Processor. († special order only; 2.5 Mbyte max.) 256k (2 Mybte †) EPROM, 64k (256k †) RAM, 128k (512k †) FLASH Memory: -RS232 at up to 9600 baud -RS232 at up to 9600 baud -Radio: 600-4800 baud, direct-FM, half/full duplex, synchronous, MDLC communication protocol **Pushbuttons:** LED on/off/test; alarm acknowledge Provides 5 Vdc @ 2 A to expansion modules; Consumes 120 ma @ 12 Vdc Power: 16 digital inputs (500 Hz) plus 2 counter inputs (10 kHz rate; 50 µsec min pulse width); up to 14 ga. wire Di Module Inputs: 1-32 msec in hardware, longer by application program Filtering: 2.5 kV; opto-isolation; on-board dc/dc converter Isolation: Per IEEE SWC 472/585 (600V discharge) Protection: Consumes 5 Vdc @ 15 ma, 12 Vdc @ 15-60 ma Power: Type 1: 16 momentary or magnetic-latch; Type 2: 8 momentary or magnetic-latch **DO Moduie** Relays: Type 1: 12 Form A, 4 Form C; Type 2: 8 Form C Configuration: 60VA rating, not to exceed 250V or 2A; up to 14 ga. wire **Contact Rating:** 1 kV between contacts, 1.5 kV contact-to-coil isolation: Per IEEE SWC 472/585 (600V discharge) Protection: Consumes 12 Vdc @ 15-300 ma Power: Eight: 4-20 ma into 250 Ω ; ± 1 ma into 4 k Ω ; ± 1 V or ± 5 V into 10 k Ω ; up to 14 ga. wire Al Module inputs: 13 bit; ±0.05% FS plus 30 ppm/ ℃ Accuracy: Conversion: 2 msec per input 2.5 kV (optical) input-to-ground, 200 V peak between inputs Isolation: Protection: Per IEEE SWC 472 Consumes 5 Vdc @ 20 ma, 12 Vdc @ 15-60 ma Power: Four: 4 − 20 ma into 250 \(\Omega\) load from internal power source, into 750 \(\Omega\) from external 24 Vdc power source; AO Module Outputs: 0-5 V into 1k Ω minimum load. Up to 14 ga. wire. 2.5 kV optical isolation provided. 12 bit; ±0.1% FS plus 30 ppm/°C Accuracy: Mixed I/O Module 8 digital inputs (may be used as counters)—see DI Module for performance specs. Inputs: 2 analog inputs; 4 – 20 ma only, 250 Ω input impedance; 10 bit, \pm 0.5% FS plus 30 ppm/ $^{\circ}$ C 4 momentary or magnetic-latch: 2 Form A, 2 Form C-see DO Module for performance specs Outputs:

Ladder Logic

Processes: Elements: **Element Types:** 1 - 8 running simultaneously

12,000 with 128k FLASH memory (50,000 with 512k FLASH memory)

Inputs

Logic (N.O., N.C., value) Comparator $(=, \neq, >, <)$ Counters (up, down)

Arithmetic (+, -, x, + Boolean (AND, OR, XOR) Index

Outputs

Timer (delay on, delay off, retentive)

Binary - BCD conversion Variable - variable conversion Text

Jump Call - Return Scan :

Shift (logic & arithmetic; left, right)

FCC Inf	ormati	ion
---------	--------	-----

rcc inioiniation					•	
Frequency Range	Model Number	Radio Type	Power Out	Rules Part	Emission Designators	Type Acceptance
136-174 MHz	F6973	MAXTRAC	20 watt	90 %	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT3733 🦈
403-430, 450-470 MHz	F6974	MAXTRAC	20 watt	90 :	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT4601
806-869 MHz Trunked	F6985	MAXTRAC	15 watt	15, 90 -	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT5653 %
928-960 MHz (12.5 kHz)	F6956	DARCOM 9000	5 watt	94 ≅:	12K5F2D, 12K5F3E, 12K5F9W	ABZ9QCC6612 2
192-960 MHz (25 kHz)	F6956	DARCOM 9000	5 watt	94 🐃	16K0F2D, 16K0F3E, 16K0F9W	ABZ9QCC8608 *≭
External radio (FSK)	F6909	External	Note:1	Note 1	Note 1	Note
External modem	F6900	None	None **	N/A ==	N/A Th	N/A
external modem	1 10300	11010	110110	1		

Note 1: Determined by External Radio Model



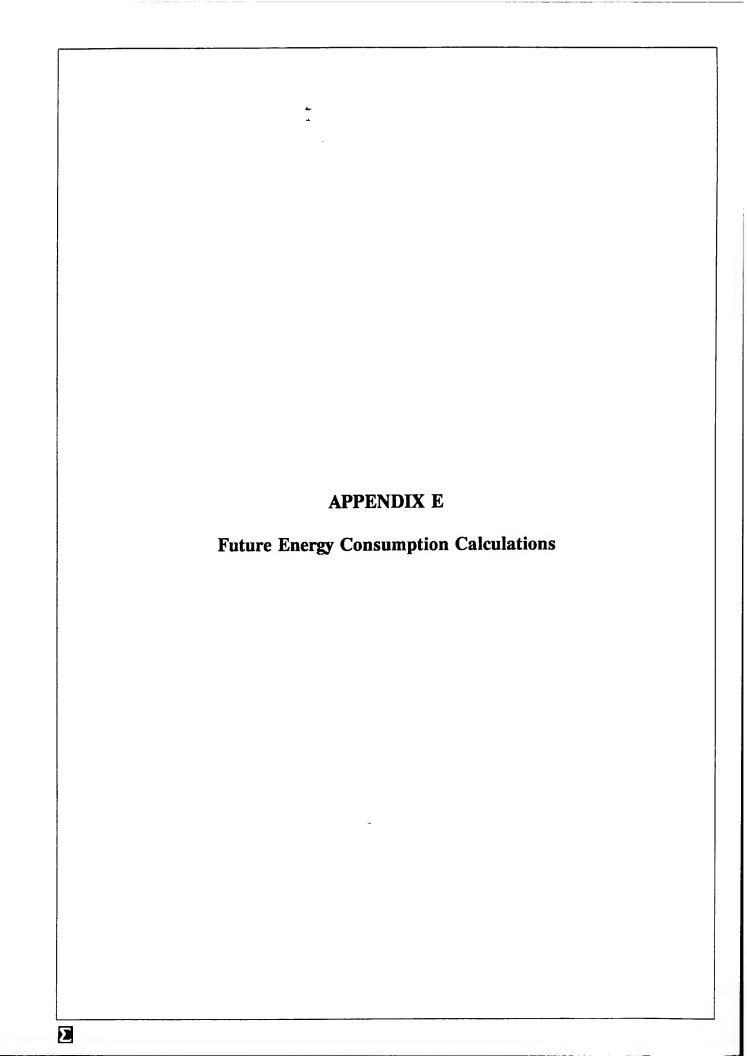




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EEAP, Limited Energy Study Fort Hunter-Liggett, California

APPENDIX E

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TABLES

E-1	Summary	Future	Energy	Use
T:-T	Summary	Tutuic	Lucisi	030

E-2

Summary Future HVAC and DHW Energy Use Summary Future Lighting and Process Energy Use E-3

Fac	Area	Total Future E	nergy Use		Energy Use pe	r Floor SF
No.	(SF)	Fuel Oil	Propane	Electric	Total	Total
		Mil BTU/Yr	Mil BTU/Yr	kW-Hr/Yr	Mil BTU/Yr	k BTU/SF-Yr
Т6	1,090		74	13,121	119	109.1
P 41A	1,397		58	21,055	129	92.6
P 41B	1,937	-	43	10,130	78	40.1
P 42A	1,937		60	22,824	138	71.1
P 42B	1,937		43	10,130	78	40.1
P 43A	1,937		60	22,824	138	71.1
P 43B	1,937		43	10,130	78	40.1
P 44A	1,937		60	22,824	138	71.1
P 44B	1,937		43	10,130	78	40.1
P 45A	1,937		60	22,824	138	71.1
P 45B	1,937		43	10,130	78	40.1
P 46	2,089		54	18,188	116	55.8
P 47	2,089		54	18,188	116	55.8
P 51A	1,937		60	22,824	138	71.1
P 51B	1,937	1	43	10,130	78	40.1
P 52A	1,937		60	22,824	138	71.1
P 52B	1,937		43	10,130	78	40.1
P 53	2,089		54	18,188	116	55.7
P 54	2,089		54	18,188	116	55.7
P 55	2,089		54	18,188	116	55.7
P 56	2,089	ŀ	54	18,188	116	55.7
P 57	2,089		54	18,188	116	55.7
P 58	2,089		54	18,188	116	55.7
P 59	2,089		54	18,188	116	55.7
P 60	2,089		54	18,188	116	55.7
S 79	1,000			4,028	14	13.7
P 80	9,093		44	140,823	524	57.7
P 81	6,719	1	150	38,996	283	42.1
P 101	6,171		1,129	207,425	1,837	82.7
	3,046					
	4,721					
	8,273					
P 116	1,126		35	7,153	59	33.2
	662	1				
T 120	3,636]	928	171,524	589	52.4
	2,653					
	4,949				2-2	20.0
T 121	4,952	1	81	79,406	353	63.2
	628		404	04.440	204	101.0
T 124	2,001		191	21,419	264	131.8
T 127	2,250]	252	7,966	279	123.9
P 128	20,196	1	1,211	305,753	2,255	111.6
T 131	998		- 69	12,570	112	111.8
S 144	7,172		53	6,909	76 070	10.6
S 146	4,042		244	8,347	272	67.3
T 149	1,196]	1.65	13,614	212	177.1
T 156	1,753	1		11,767	40	17.8
T 450	497					2.1
T 158	1,859	1	4.5	50	0.2	0.1
T 161	2,250	1	46	13,317	92	40.8
T 162	2,250	1	46	8,662	76 07	33.7
T 163	2,250	I	46	6,013	67	29.7

Fac	Area	Total Future E	nergy Use		Energy Use per Floor SF		
No.	(SF)	Fuel Oil	Propane	Electric	Total	Total	
		Mil BTU/Yr	Mil BTU/Yr	kW-Hr/Yr	Mil BTU/Yr	k BTU/SF-Yr	
T 164	2,250		46	9,737	80	35.3	
T 165	2,250		46	9,737	80	35.3	
T 166	2,250		46	6,013	67	29.7	
T 167	2,250		46	6,013	67	29.7	
S 168	6,560			178	1	0.1	
T 172	800			22	0	0.1	
P 177	3,599		6	30,174	109	30.3	
P 178	3,599		117	41,949	260	72.2	
S 182	3,000		22	204,002	718	239.4	
S 186	1,920		84	18,438	147	76.4	
P 190	2,720	306		44,515	458	168.5	
S 197	2,100		262	117,984	665	81.5	
	6,062			5.004	67	64.6	
S 198	1,090		49	5,304	67 2 527	61.6 61.7	
P 205	35,820	1,412		326,553	2,527	61.7	
P 205A	5,161	4 700		206 765	E 760	344.0	
P 206	16,768	4,722		306,765	5,769	3 44 .U	
P 207	35,820	1,675		319,685	2,766	67.5	
P 207A	5,161	1,070		0.0,000	_,,,,,,		
P 208	35,820	1,714		325,741	2,826	68.9	
P 208A	5,161	,,,		,	ĺ		
P 209	3,320		82	205,360	783	235.9	
P 210	10,973	2,971		319,912	4,063	370.2	
P 211			1,184	36,436	1,308	•	
P 212	8,907	1	752	86,888	1,048	117.7	
P 219	3,212		471	46,441	630	196.0	
P 229	40,915	1,495		308,786	2,549	55.3	
P 229A	5,161						
P 230	35,820	1,662		336,971	2,812	68.6	
P 230A	5,161	141	•				
S 235	3,000		46	32,302	157	52.2	
S 236	3,000		47	32,302	157	52.4	
S 237	3,000		115	32,302	225	75.0	
S 238	14,548		529	105,521	889	61.1	
P 240	3,000		38	32,302	148	49.5	
S 241	10,000		148	216,853	741	74.1	
3 241	10,000		7.13	210,000			
S 243	3,000		33	32,302	143	47.8	
S 244	3,000		33	32,302	143	47.8	
S 246	3,000		- 33	32,302	143	47.8	
S 247	3,000		38	32,302	148	49.5	
P 252	12,299	686		53,478	868	70.6	
P 256	5,294	340		29,380	440	83.2	
P 259	13,667	860		55,735	1,050	76.8	
S 283	4,000		120	10,336	155	38.8	
S 286	3,000		57	31,224	163	54.5	
P 287	5,584		172	80,676	447	80.1	
	3,000	1	57	28,590	154	51.5	

TABLE E-1 SUMMARY FUTURE USE

Fac	Area	Total Future E	nergy Use		Energy Use per Floor SF		
No.	(SF)	Fuel Oil	Propane	Electric	Total	Total	
	(,	Mil BTÚ/Yr	Mil BTU/Yr	kW-Hr/Yr	Mil BTU/Yr	k BTU/SF-Yr	
S 290	14,856		599	187,081	1,237	83.3	
S 291	7,400		366	109,513	740	99.9	
P 295	46,593		1,619	787,968	4,309	92.5	
P 301	10,800		34	632,399	2,158	199.9	
D 640	995		86	1,002	89	89.7	
P 642 S 2201	891		00	1,155	4	4.4	
Bldg Totals	625,458	17,843	13,410	7,192,590	54,695	87.4	
Water Well				136,240	465		
Exterior Lighting				197,190	673		
Non-Scope SF	152,002			1,481,731	5,057	33.3	
Grand Total	777,460	17,843	13,410	9,007,751	60,890	78.3	

Fac	Area	Future HVAC	Energy Use		Future DHW B	nergy Use	
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
T 6	1,090	0	23.9	4,972	0	39.7	0
P 41A	1,397	0	14.4	10,924	0	32.6	0
P 41B	1,937	0	0.0	0	0	32.6	0
P 42A	1,937	0	16.8	12,694	0	32.6	0
P 42B	1,937	0	0.0	0	0	32.6	0
P 43A	1,937	0	16.8	12,694	0	32.6	0
P 43B	1,937	0	0.0	0	0	32.6	0
P 44A	1,937	0	16.8	12,694	0	32.6	0
P 44B	1,937	0	0.0	0	0	32.6	0
P 45A	1,937	0	16.8	12,694	0	32.6	0
P 45B	1,937	0	0.0	0	0	32.6	0
P 46	2,089	0	11.1	7,726	0	32.8	0
P 47	2,089	0	11.1	7,726	0	32.8	0
P 51A	1,937	0	16.8	12,694	0	32.6	0
P 51B	1,937	0	0.0	0	0	32.6	0
P 52A	1,937	0	16.8	12,694	0	32.6	0
P 52B	1,937	0	0.0	0	0	32.6	0
P 53	2,089	0	11.1	7,726	0	32.6	0
P 54	2,089	0	11.1	7,726	0	32.6	0
P 55	2,089	0	11.1	7,726	0	32.6	0
P 56	2,089	0	11.1	7,726	0	32.6	0
P 57	2,089	0	11.1	7,726	0	32.6	0
P 58	2,089	0	11.1	7,726	0	32.6	0
P 59	2,089	0	11.1	7,726	0	32.6	0
P 60	2,089	0	11.1	7,726	0	32.6	0
S 79	1,000	0	0.0	1,565	0	0.0	0
P 80	9,093	0	43.9	4,890	0	0.0	13,813
P 81	6,719	0	150.0	9,488	0	0.0	26,931
P 101	6,171	0	490.6	(9,390)	0	88.0	0
	3,046	0	359.4	12,941	0	18.2	0
	4,721	0	0.0	134,563	0	60.7	0
	8,273	0	0.0	0	0	101.8	0
P 116	1,126	0	35.0	. 0	0	0.0	826
	662	0	0.0	1,550	0	0.0	0
T 120	3,636	0	429.2	11,757	0	28.0	0
	2,653	0	324.2	3,459	0	149.6	0
	4,949	0	0.0	0	0	(3.4)	0
T 121	4,952	0	47.0	25,804	0	34.5	0
	628	0	0.0	0	0	0.0	7,369
T 124	2,001	0	145.8	11,148	0	34.4	0
T 127	2,250	0	154.1	1,036	0	97.4	0
P 128	20,196	0	546.9	86,934	0	664.3	0
T 131	998	0	17.4	- 4,490	0	40.8	0
S 144	7,172	0	52.5	418	0	0.0	0
S 146	4,042	0	243.7	1,442	0	0.0	0
T 149	1,196	0	109.7	6,656	0	45.2	0
T 156	1,753	0	0.0	823	0	0.0	639
	497	0	0.0	0	0	0.0	0
T 158	1,859	0	0.0	0	0	0.0	0
T 161	2,250	0	46.3	2,638	0	0.0	0
T 162	2,250	0	46.3	2,638	0	0.0	0
T 163	2,250	0	46.3	2,638	0	0.0	0

Fac	Area	Future HVAC	Energy Use		Future DHW B	Energy Use	
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
110.	(0.)	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
T 164	2,250	0	46.3	2,638	0	0.0	0
T 165	2,250	0	46.3	2,638	0	0.0	0
T 166	2,250	0	46.3	2,638	0	0.0	0
T 167	2,250	0	46.3	2,638	0	0.0	0
S 168	6,560	0	0.0	0	0	0.0	0
T 172	800	0	0.0	0	0	0.0	0
P 177	3,599	0	6.1	10,869	0	0.0	0
P 178	3,599	0	63.8	12,405	0	53.0	0
S 182	3,000	0	22.0	3,121	0	0.0	3,059
S 186	1,920	0	83.7	5,480	0	0.0	0
P 190	2,720	306	0.0	36,505	0	0.0	2,056
S 197	2,100	0	262.4	16,361	0	0.0	418
	6,062	0	0.0	62,202	0	0.0	0
S 198	1,090	0	49.1	356	0	0.0	0
P 205	35,820	1,347	0.0	168,458	65	0.0	0
P 205A	5,161	0	0.0	0	0	0.0	407
P 206	16,768	3,840	0.0	108,696	882	0.0	^
		0	0.0	0	0	0.0	0
P 207	35,820	1,338	0.0	168,577	337	0.0	0 576
P 207A	5,161	0	0.0	0	0	0.0	576
P 208	35,820	1,339	0.0	169,882	375	0.0 0.0	0 629
P 208A	5,161	0	0.0 82.3	0 56,989		0.0	37,445
P 209	3,320	1 000	0.0	153,565	1,968	0.0	0
P 210	10,973	1,003	1,183.5	36,436	0	0.0	0
P 211	8,907	0	733.6	47,849	١	18.3	
P 212 P 219	3,212	Ĭ	415.4	17,812	0	55.8	0
P 229	40,915	1,338	0.0	177,788	157	0.0	0
P 229A	5,161	0	0.0	o	0	0.0	568
P 230	35,820	1,338	0.0	185,146	324	0.0	0
P 230A	5,161	l o	0.0	0	0	0.0	594
S 235	3,000	0	46.4	18,805	0	0.0	0
S 236	3,000	0	46.9	18,805	0	0.0	0
S 237	3,000	0	114.9	18,805	0	0.0	0
S 238	14,548	0	494.8	31,024	0	34.4	0
		0	0.0	0	0	14.1	0
P 240	3,000	0	38.2	18,805	0	0.0	0
S 241	10,000	0	147.6	162,955	0	0.0	2,719
		0	0.0	0	0	0.0	0
		0	0.0	0	0	0.0	0
S 243	3,000	0	33.0	18,805	0	0.0	0
S 244	3,000	0	33.0	18,805	0	0.0	0
S 246	3,000	0	33.0	18,805	0	0.0	0
S 247	3,000	0	38.2	18,805	0	0.0	0 730
P 252	12,299	686	0.0	20,340	0	0.0	2,732
P 256	5,294	340	0.0	10,742	0 0	0.0 0.0	4,590 2,560
P 259	13,667	860	0.0	19,377 452	0	0.0	2,560 0
S 283	4,000	0	119.8 0.0	452	0	0.0	0
000	0.000	0	56.9	18,805	0	0.0	0
S 286	3,000	0 0	131.7	53,904	0	40.3	0
P 287	5,584 3,000	0	56.9	18,805	0	0.0	0
S 288	3,000	1	50.9	10,003	1 0	0.0	J

TABLE E-2 SUMMARY FUTURE HVAC & DHW ENERGY USE

Fac	Area	Future HVAC	Energy Use		Future DHW Energy Use		
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
	,	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
S 290	14,856	0	556.4	141,463	0	42.1	0
		0	0.0	0	0	0.0	0
S 291	7,400	0	365.8	90,929	0	0.0	0
P 295	46,593	0	1,014.5	629,841	0	605.0	0
P 301	10,800	0	34.2	79,517	0	0.0	1,832
		0	0.0	0	0	0.0	0
		0	0.0	0	0	0.0	0
P 642	995	0	0.0	19	0	85.9	0
S 2201	891	0	0.0	349	0	0.0	0
Bldg Totals	625,458	13,735	9,988	3,364,812	4,107	3,132	109,763
Water Well							
Exterior Lighting							
Non-Scope SF	152,002	Nil	Nil	999,260	Nil	Nil	Nil
Grand Total	777,460	13,735	9,988	4,364,072	4,107	3,132	109,763

Fac	Area	Lighting	Future Process Energy Use		
No.	(SF)	Energy	Process	Cooking	Cooking & Other
		kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr
Т 6	1,090	2,250	5,900	Included	10.5
P 41A	1,397	4,230	5,900	Included	10.5
P 41B	1,937	4,230	5,900	Included	10.5
P 42A	1,937	4,230	5,900	Included	10.5
P 42B	1,937	4,230	5,900	Included	10.5
P 43A	1,937	4,230	5,900	Included	10.5
P 43B	1,937	4,230	5,900	included	10.5
P 44A	1,937	4,230	5,900	Included	10.5
P 44B	1,937	4,230	5,900	Included	10.5
P 45A	1,937	4,230	5,900	Included	10.5
P 45B	1,937	4,230	5,900	Included	10.5
P 46	2,089	4,562	5,900	Included	10.5
P 47	2,089	4,562	5,900	Included	10.5
P 51A	1,937	4,230	5,900	Included	10.5
P 51B	1,937	4,230	5,900	Included	10.5
P 52A	1,937	4,230	5,900	Included	10.5
P 52B	1,937	4,230	5,900	Included	10.5
P 53	2,089	4,562	5,900	Included	10.5
P 54	2,089	4,562	5,900	included	10.5
P 55	2,089	4,562	5,900	Included	10.5
P 56	2,089	4,562	5,900	Included	10.5
P 57	2,089	4,562	5,900	Included	10.5
P 58	2,089	4,562	5,900	Included	10.5
P 59	2,089	4,562	5,900	Included	10.5
P 60	2,089	4,562	5,900	Included	10.5
S 79	1,000	764	1,700		0.0
P 80	9,093	10,036	112,084		0.0
P 81	6,719	1,518	1,058		0.0
P 101	6,171	8,423	0	39,420	0.0
	3,046	0	6,092	5,475	0.0
	4,721	o	4,000	,	0.0
	8,273	0	5,900	Included	10.5
P 116	1,126	3,170	481		0.0
	662	0	1,126		0.0
T 120	3,636	143,185	3,291		0.0
	2,653	0	2,800	6,899	0.0
	4,949	ol	134	-,	0.0
T 121	4,952	23,131	4,482	5,475	0.0
	628	0	13,144	-,	0.0
T 124	2,001	4,370	5,900	Included	10.5
T 127	2,250	2,930	4,000		0.0
P 128	20,196	134,259	32,000	52,560	0.0
T 131	998	2,180	5,900	Included	10.9
S 144	7,172	2,100	6,491		0.0
S 146	4,042	5,179	1,727		0.0
T 149	1,196	1,059	5,900	Included	10.
T 156	1,753	9,106	749		0.0
	497	0,100	450		0.0
T 158	1,859	٥	50		0.0
T 161	2,250	8,643	2,036		0.0
T 162	2,250	5,063	961		0.0

Fac	Area	Lighting	Future Process Energy Use			
No.	(SF)	Energy	Process	Cooking	Cooking 8	& Other
	` ′	kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop Mil	
T 164	2,250	5,063	2,036	 		0.0
T 165	2,250	5,063	2,036			0.0
T 166	2,250	3,375	NA			0.0
T 167	2,250	3,375	NA.			0.0
S 168	6,560	0	178			0.0
T 172	800	0	22	Also see E	3ldg 182	
P 177	3,599	16,048	3,257			0.0
P 178	3,599	19,089	272	10,184		0.0
S 182	3,000	25,040	172,782			0.0
S 186	1,920	11,221	1,738			0.0
P 190	2,720	3,253	1,058	1,643		0.0
S 197	2,100	34,513	1,901			0.0
	6,062	0	2,589			0.0
S 198	1,090	3,961	986			0.0
P 205	35,820	90,408	32,417			0.0
P 205A	5,161	30,192	4,671			0.0
P 206	16,768	43,023		155,046		0.0
		0				0.0
P 207	35,820	83,669	32,000			0.0
P 207A	5,161	30,192	4,671			0.0
P 208 P 208A	35,820	84,368	36,000 4,671			0.0 0.0
P 209	5,161 3,320	30,192 5,736	6,640	98,550		0.0
P 210	10,973	126,081	37,308	2,957		0.0
P 211	- 10,370	120,001	07,000	2,001		0.0
P 212	8,907	33,566	5,473			0.0
P 219	3,212	25,722	2,907			0.0
P 229	40,915	84,368	11,200			0.0
P 229A	5,161	30,192	4,671			0.0
P 230	35,820	84,368	32,000			0.0
P 230A	5,161	30,192	4,671			0.0
S 235	3,000	10,783	2,715			0.0
S 236	3,000	10,783	2,715			0.0
S 237	3,000	10,783	2,715			0.0
S 238	14,548	44,905	13,166	-		0.0
		0	16,425	0		0.0
P 240	3,000	10,783	2,715			0.0
S 241	10,000	42,129	9,050			0.0
		0				0.0
0.040	0.000	10.700	0.715			0.0
S 243	3,000	10,783	2,715			0.0
S 244	3,000	10,783	2,715			0.0
S 246 S 247	3,000 3,000	10,783 10,783	2,715 2,715			0.0 0.0
P 252	12,299	25,152	5,254			0.0
P 256	5,294	11,787	2,261			0.0
P 259	13,667	27,960	5,838			0.0
S 283	4,000	8,176	1,709			0.0
	-,	0				0.0
S 286	3,000	9,704	2,715			0.0
P 287	5,584	15,604	11,168			0.0
S 288	3,000	9,704	- 81			0.0

TABLE E-3 SUMMARY FUTURE LIGHTING & PROCESS ENERGY USE

Fac	Area	Lighting	Future Process Energy Use		
No.	(SF)	Energy	Process	Cooking	Cooking & Other
		kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr
S 290	14,856	39,273	6,346		0.0
		0			0.0
S 291	7,400	15,423	3,161		0.0
P 295	46,593	112,527	45,600		0.0
P 301	10,800	46,003	9,774		0.0
		0	495,272		0.0
		0			0.0
P 642	995	983			0.0
S 2201	891	0	806		0.0
Bldg Totals	625,458	1,911,353	1,428,456	378,207	304.5
Water Well			136,240		
Exterior Lighting		197,190			
Non-Scope SF	152,002	475,935	6,536	Shop/Whs	se
Grand Total	777,460	2,584,477	1,571,232	378,207	304.5
	625,458				

2,108,543

1,564,696 378,207

305



PAD MOUNTED CAPACITOR ASSEMBLIES

Metal Enclosed Capacitor Assemblies Pad Mounted 5 and 15kV Class

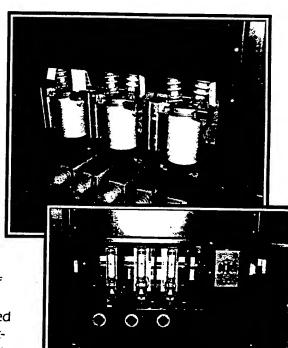
Pad Mounted Capacitor Assemblies to meet maximum kVAR requirements, while maintaining aesthetic concerns, are available from ABB. These low profile, economical units are provided for both 5kV and 15kV class applications. Pad Mounted Capacitor Assemblies will help to correct poor power factor and reduce demand on substation transformers.

General Features

Rugged 11-gauge steel, finished with two coats of baked enamel, make the enclosures sturdy, weather resistant and attractive. Available in a bolted or welded construction, these units offer front and rear door access, (dead-front) barriers, and a 3-point latching system, with means for padlocking, to insure security. Other standard enclosure features include non-corrosive hardware, ventilation, lifting provisions and a domed roof.

Typically, these assemblies are (60"H x 60"W x 60"D) and will meet a wide range of capacitor application needs. Capacitors can be standard or inverted mount to allow for oil or vacuum switching arrangements, bushings, continuous ground bus, and individual or group fusing.

Various options are available such as key interlocks, control power transformer, pentahead bolts, and custom controls. All Pad Mounted Capacitor Assemblies are designed and built in accordance with applicable ANSI, NEMA, and IEEE standards.



- Compact Design
- Economical
- Rugged Construction
- Tamper Resistant
- Available Through 2400 kVAR



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